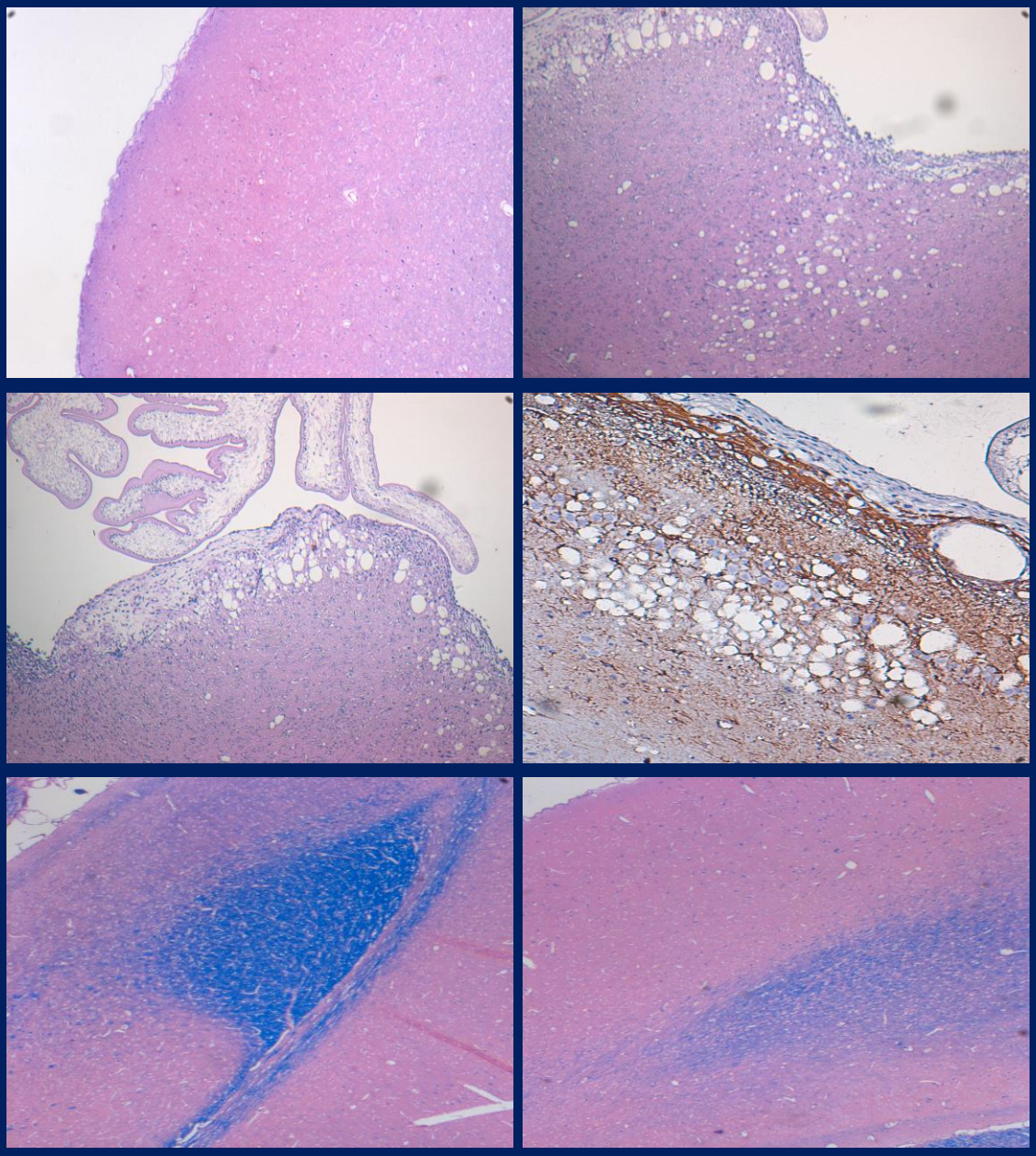
6th Annual
Medical Student Research Day



Feburary 14, 2014

Johns Hopkins University School of Medicine
Armstrong Medical Education Building

Cover image courtesy of

Sarah Saleemi, MS2

Neurocysticercosis is the leading cause of epilepsy in the developing world. It is a parasitic disease caused by the tapeworm, *Taenia solium.* The recent development of a rat model of the disease by researchers at the Universidad Peruana Cayetano Heredia in Lima, Peru has allowed new discoveries to be made in its pathogenesis. Pictured are several stained sections of rat cortex from infected and noninfected rats which illustrate and may explain a form of degenerative spongiosis which occurs in multiple animal models of neurocysticercosis and may also occur in humans. These slides suggest that neurocysticercosis may be a demyelinating disease.

Top left: Normal cortex from an uninfected rat.
Top right: Spongiotic cortex from a rat infected with neurocysticercosis.
Middle left: Hematoxylin and Eosin stain of cortex from an infected rat, illustrating lack of fibrotic tissue within spongiotic 'holes'.
Middle right: Glial fibrillary acidic protein (GFAP) antibody stain of cortex from an infected rat suggests astrogliosis in the vicinity of parasitic cysts.
Bottom left: Luxol-acid fast blue stain of uninfected rat cortex demonstrating normal amount of myelin as identified by blue pigment.
Bottom right: Luxol-acid blue stain of infected rat cortex demonstrating decreased amounts of blue-staining myelin as compared to a healthy rat, left.

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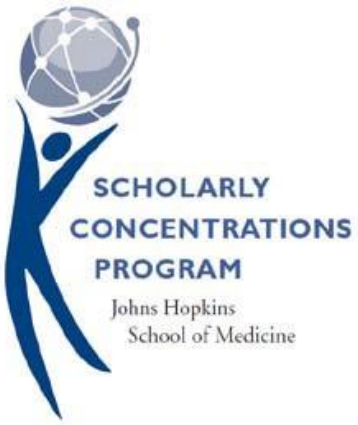
Medical Student Research Day 2014

We are pleased to have you join us for the 6th annual Medical Student Research Day of the Johns Hopkins University School of Medicine. As clinicians in training, we are fortunate to work among faculty who conduct a broad range of investigation that yields advances in the knowledge of human health. For the past five years, we have been privileged to have an event that presents the extensive endeavors that students take to advance this mission at the school.

The mission of the Johns Hopkins University School of Medicine is to educate medical students, graduate students, and postdoctoral fellows in accordance with the highest professional standards; to prepare clinicians to practice patient-centered medicine of the highest standard; and to identify and answer fundamental questions in the mechanisms, prevention and treatment of disease, in health care delivery and in the basic sciences.

Medical Student Research Day is a forum for medical students at Johns Hopkins to present their own research to the greater Hopkins community. It is an opportunity for students to participate in the exchange of intellectual ideas in a professional format and meet faculty who relish the pursuit of better science and more effective medicine. Our mission is for Medical Student Research Day to foster the development of young researchers who will aid in the advancement of scientific medicine for years to come.



The Scholarly Concentration (SC) program is a faculty-mentored scholarly experience for medical students. This program provides the infrastructure and mentoring necessary for students to produce a scholarly project in an area of individual interest, and encourages the acquisition of attitudes and skills for lifelong learning and scholarship. The SC program offers the following five areas of study:

Basic Science	Sarah Wheelan M.D., PhD Leslie Cope PhD
Clinical Research	Kelly Gebo, MD, MPH Jennifer Haythornthwaite, PhD Steve Sozio, MD, MHS John J. Strouse, MD, PhD
History of Medicine	Jeremy Greene M.D., PhD,
Medical Humanities Bioethics and The Healing Arts	Joe Carrese, MD, MPH Gail Geller, ScD, MHS
Public Health and Community Service	Eric Bass, MD, MPH David Friedman, MD, PhD

The overall goals of the SC program are to promote intellectual curiosity, appreciation of scholarly inquiry, flexibility, passion for discovery, openness to new ideas, and the ability to work both independently and collaboratively.

PROGRAM SCHEDULE

12:00 – 12:30 PM	**Registration/Lunch** *AMEB Main Lobby*
12:30-2:15 PM	**Podium Presentations** *AMEB Lecture Hall*
2:15-3:45 PM	**Poster Session** *AMEB 2nd Floor*
3:45-4:45 PM	**Concurrent Oral Presentations** *RM320, 326, 341, 342, 343, 344, 345, 370*
4:45-5:30 PM	**Keynote speaker, *Dr. Dorry Segev*** **MSRD Award Ceremony** *AMEB Lecture Hall*

KEYNOTE SPEAKER

Dorry Segev, MD

Associate Professor of Surgery and Epidemiology at the Johns Hopkins University School of Medicine

Dr. Dorry Segev is a pioneer in abdominal transplant surgery who has made numerous critical contributions to the field of transplantation through his work in complex statistical analyses for mathematical modeling of transplantation allocation and outcomes and simulation of medical data. He specializes in innovative strategies for incompatible organ transplantation, minimally invasive live donor surgery, and disparities in access to transplantation. His many accomplishments include developing a mathematical model to facilitate a nationwide Kidney Paired donation program in both the United States and Canada, for which he received the American Society of Transplant Surgeons 2006 Vanguard Prize and was featured in the TIME magazine “Innovators” issue.

Dr. Segev received his undergraduate degree in computer science before receiving his medical school, general surgery, and multi-visceral abdominal transplant surgery training at Johns Hopkins. Since then, he has authored more than 150 peer-reviewed research articles in journals including New England Journal of Medicine, JAMA, American Journal of Transplantation, Annals of Surgery, and Journal of the American Society of Nephrology. He is an NIH Clinical Research Scholar, American Geriatrics Society Dennis Jahnigen Scholar, National Institute of Aging Paul Beeson Scholar, senior investigator for the Scientific Registry for Transplant Recipients, and Doris Duke Clinical Scientist Development Award recipient.

In addition to his many achievements in transplant surgery, Dr. Segev has also received multiple awards in Lindy Hop and swing dancing including placing multiple times in the American Lindy Hop Championships and winning the 2002 UK Championship with his wife and research partner Sommer Gentry.

Dr. Segev is an Associate Editor for the American Journal of Transplantation, American Journal of Kidney Diseases and Liver Transplantation. His work has been regularly featured in TIME magazine, the Discovery Channel, US News & World Report, the New York Times, and other prominent media outlets.

Faculty Judges

Meredith Atkinson, MD, MHS
Assistant Professor of Pediatrics

Eric Bass, MD, MPH
Professor of Medicine
Director of Evidence-based Practice Center

Mary Catherine Beach, MD, MPH
Associate Professor of Medicine

Diane Becker, ScD, MPH
Professor of Medicine
Director of Center for Health Promotion

Melania Bembea, MD, MPH
Assistant Professor of Pediatric Anesthesiology
Director of PICU Clinical Research Program

Wendy Bennett, MD, MPH
Assistant Professor of Medicine

Zachary Berger, MD, PhD
Assistant Professor of Medicine

Stephen Berry, MD
Assistant Professor of Medicine

Todd Brown, MD, PhD
Associate Professor of Medicine

Kathleen Burns, MD, PhD
Assistant Professor of Pathology, Pathobiology Graduate Program, and Oncology

Claudia Campbell, PhD
Assistant Professor of Psychiatry and Behavioral Science

Joseph Carrese, MD, MPH
Associate Professor of Medicine

Geetanjali Chander, MD, MPH
Associate Professor of Medicine and Epidemiology

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Director of Education at Johns Hopkins Bayview Department of Psychiatry

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Fellow in Pulmonary and Critical Care Medicine

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Mollie Jenckes, MHSC, BSN
Research Faculty in General Internal Medicine

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Geriatric Medicine, and Epidemiology

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Faculty in Surgery

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John Wrangle, MD, MPH
Instructor of Oncology Center-Cancer Biology

Sarah Wheelan, MD, PhD
Assistant Professor of Oncology Center-Biostatistics and Bioinformatics

Jonathan Zenilman, MD
Professor of Medicine-Infectious Disease

Schedule of Podium Presentations

12:30 pm	Nicole Jiam	*Sorting nexin 27: A fundamental mediator of AMPA receptor trafficking and synaptic plasticity*
12:40 pm	Sharon Weeks	*A modified Kampala Trauma Score (KTS) outperforms the Injury Severity Score (ISS) in trauma mortality prediction*
12:50 pm	Dinah Lewis	*Unintended sexual consequences of drinking among women attending an urban STI clinic*
1:00 pm	Marcelo Cerullo	*Faster is Better: Enhanced Enrollment in Public Insurance Programs Reduces Pediatric Mortality following Traumatic Brain Injury*
1:10 pm	Jonathan Yeh	*Using a Question-Prompt List as a Communication Aid for Advanced Cancer Care*
1:20 pm	Diane Kuhn	*The Rise of Leishmaniasis in Rio de Janeiro in the Context of Political Decentralization*
1:30 pm	Sepehr Tehrani	*Selectively Permeable Nanofiber Constructs To Prevent Inflammatory Scarring And Enhance Nerve Regeneration in Peripheral Nerve Injury*
1:40 pm	Kevin Curtiss	*A comparison of minimally invasive approaches to partial nephrectomy: a multi-surgeon analysis from a large tertiary care center*
1:50 pm	Alexandra Robison	*Incorporating Discussions of Spirituality and Religiosity into NICU Family Meetings*
2:00 pm	Tina Munjal	*Use of the Phantom Electrode Strategy to Improve Bass Frequency Perception For Music Listening in Cochlear Implant Users*

Schedule of Concurrent Oral Presentations

Basic Science: Room 320

3:45-3:55 pm	Maimon Hubbi	*Degradation of HIF-1α Through Autophagy is Essential for DNA Replication in Cancer Cells*
3:55-4:05 pm	Tamara Ashvetiya	*Age-Related Differences in Paracrine-Mediated Angiogenesis*
4:05-4:15 pm	Jesse Qualliotine	*Myeloid-Derived Suppressor Cells Directly Enhance Tumor Proliferation*
4:15-4:25 pm	Harrison Tsai	*Genome-wide RNA sequencing analysis of androgen independent prostate cancer cell lines*
4:25-4:35 pm	Zhikui Wei	*Targeted disruption of C1q/TNF-related protein 9 (CTRP9) increases food intake, decreases insulin sensitivity, and promotes hepatic steatosis in mice*

Clinical Research 1: Room 326

3:45-3:55 pm	Charles Farmer	*Factors Associated with Early Retention among Non-Perinatally HIV-Infected Youth*
3:55-4:05 pm	Mohamud Qadi	*Are Flaps Really Better Than Implants For Breast Reconstruction In Obese Females? An Analysis Of 89,514 Women Undergoing Breast Surgery From The ACS-NSQIP Database*
4:05-4:15 pm	Shalini Moningi	*Impact of a Single-Day Multidisciplinary Clinic on the Management of Pancreatic Cancer: A 6-Year Report*
4:15-4:25 pm	Nicholas Abt	*Neoadjuvant Chemotherapy is Associated with Decreased Morbidity amongst 77,958 Patients Undergoing Mastectomy-only and Immediate Tissue Expander Reconstruction*
4:25-4:35 pm	Andrea Yonge	*Assessment of motor speed in children with concussion*

Clinical Research 2: Room 343

3:45-3:55 pm	Tim Xu	*Evaluation of Noninvasive Hemoglobin Monitoring in Surgical Critical Care Patients*
3:55-4:05 pm	Andrea Jonas	*Impaired Fasting Glucose is Followed by More Rapid Decline in Lung Function in Cystic Fibrosis*
4:05-4:15 pm	Jacob Sama	*Epidemiology of pulmonary (PTB) and extra pulmonary (EPTB) tuberculosis (TB) in Baltimore City.*
4:15-4:25 pm	Joshua Trebach	*Extragenital Gonorrhea and Chlamydia in Exposed Women Attending Two Baltimore City Sexually Transmitted Diseases Clinics*

Clinical Research 3: Room 341

3:45-3:55 pm	Angela Zeng	*NSAIDs in the management of post-cesarean pain: a meta-analysis*
3:55-4:05 pm	Brooks Puchner	*Upregulation of angiogenic mediator angiopoietin-like 4 (ANGPTL4) in the vitreous of eyes with proliferative diabetic retinopathy*
4:05-4:15 pm	Georgia C Yalanis	*Mastectomy Flap Weight and Tissue Expander Fill Volume Predict Skin Necrosis and Increased Costs Associated with Breast Reconstruction*
4:15-4:25 pm	Albert Lwin	*Economics of an Emergency Room Visit After a Minor Injury: The Cost of Not Being Insured*
4:25-4:35 pm	Heather Rosengard	*Enhanced Imaging of Infantile Hemangiomas by Infrared Thermography*

Clinical Research 4: Room 342

3:45-3:55 pm	Michael Foote	*CUTAGENE: A new, non-invasive diagnostic method for diagnosing melanoma*
3:55-4:05 pm	Nathan Bales	*Retrospective Chart Review for Comparison of Broad Panel and Specific Genetic Testing in Children with Inherited Hypertrophic Cardiomyopathy*
4:05-4:15 pm	Linda Yin	*A New Endoscopic Staging System for Hereditary Hemorrhagic Telangiectasia*
4:15-4:25 pm	Elizabeth Yiru Wu	*Epithelial cell adhesion molecule (EpCAM) expression in invasive and in situ lobular carcinomas.*
4:25-4:35 pm	David Kirby	*Proteome characterization of normal human iris*

Medical Humanities and Public Health: Room 344

3:45-3:55 pm	Maxine Norcross	*Taking the Pulse on Medical Student and Faculty Well-Being: Toward a Comprehensive Wellness Program*
3:55-4:05 pm	Fiona Gispen	*Hearing Loss Associated with Lower Levels of Physical Activity in the Elderly*
4:05-4:15 pm	Natasha Gupta	*Actual and Perceived Knowledge of Kidney Transplantation and the Pursuit of a Live Donor*
4:15-4:25 pm	Emma Steinberg	*"You Can't Play Games When it Comes to Health": The Perspective of Limited English Proficiency Latina Mothers on Overcoming Language Barriers in Pediatric Healthcare*
4:25-4:35 pm	Nymisha Chilukuri	*The TechMom Study: Use of Health-related Information & Communication Technology (ICT) in Pregnant and Postpartum Women*

Public Health 1: Room 345

3:45-3:55 pm	Robert Lord	*Patient Employment Losses During 5-Year Follow-Up After Acute Lung Injury*
3:55-4:05 pm	Meera Chappidi	*Sickle Cell Infusion Center For the Treatment of Vaso-Occlusive Crises: Does duration of enrollment alter healthcare utilization and costs?*
4:05-4:15 pm	Ruben Troncoso	*Fatal Nightclub Fires*
4:15-4:25 pm	Ahad Waraich	*A New Role for Pharmacy Technicians in Medication History Taking and Management*
4:25-4:35 pm	Ruchi Srivastava	*Commercial Weight Loss Programs - Which Ones Work? A Systematic Review*

Public Health 2: Room 370

3:45-3:55 pm	Nathaniel Shalom	*Biodistribution of [18F]XTRA - A Novel PET Agent for Imaging Extrathalamic α4β2 Nicotinic Acetylcholinergic Receptors*
3:55-4:05 pm	Alexander Fischer	*Adults with previous nonmelanoma skin cancer still suffer from sunburns despite improvements in sun-protection practices*
4:05-4:15 pm	Mac Henry	*Improvements in Hemogolobin A1c Testing Rates at Baltimore Healthcare for the Homeless*
4:15-4:25 pm	Sneha Shah	*Why are Patients being Readmitted after Surgery for Esophageal Cancer?*
4:25-4:35 pm	Adi Rattner	*Sleep-Disordered Breathing in High-Altitude Peruvian Communities*

POSTER PRESENTERS

AMEB 2nd Floor

Listed Alphabetically by Research Category

BASIC SCIENCE

#	Name	Title
1	Daniel Ardeljan	The role of miRNA-21 knockout in the development of fibrotic bladder in mice fed a high fat diet
2	Zachary Cordner	Maternal High Fat Diet Exposure Affects Behavior, Cognition, and Hippocampal Gene Expression of Adult Offspring in Wild-Type Rats
3	Yarden Fraiman	High levels of FLT3 ligand (FL) reverse etoposide resistance in FLT3-mutant acute leukemia via substrate inhibition: implications for treatment
4	Robert Hughes	Androgen Mediated SPARCL1 Loss in Prostate Cancer
5	Saami Khalifian	Novel Tolerogenic Therapies in Transplant Immunology: Targeting Inflammatory Cytokines to Modulate Alloreactive T cell Susceptibility to Immune-Regulation
6	Mohamed Khattab	Small molecule–siRNA conjugates for targeted knockdown of DNA-PK and radiosensitization of prostate cancer cell lines.
7	Patrick Mullane	An Expression Guided Screen for Small Molecules Targeting the Lethal Phenotype of Prostate Cancer
8	Matthew Naumann	Analysis of Posterolateral Lumbar Spinal Fusion Using Reconstructed CT Radiographs, Biomechanical Testing, and Manual Assessment in PTH(1-34) and RhBMP-2 Treated Rabbits
9	Suresh K. Nayar	Autophagic Role of Yes-Associated Protein in Hepatocellular Carcinoma
10	Seyed Alireza Rabi	Multi-step inhibition explains HIV-1 protease inhibitor pharmacodynamics and resistance
11	John-William Sidhom	Design & Development of Novel Filtration Device for the Removal of Immunogenic Wear Debris in Artificial Joints
12	Mark Wilcox	Insular cortex responses associated with electrical stimulation in basolateral amygdala

CLINICAL RESEARCH

#	Name	Title
13	Rachel Blair	Multiple Brown Tumors Mimicking Metastasis in Parathyroid Carcinoma (Note: This is a clinical vignette rather than original clinical research)
14	Allison Brandt	ACC Glutamate and Cognitive Function in Patients with Schizophrenia
15	Jason E Cohen	Multidisciplinary clinic evaluation changes prostate cancer stage and risk stratification
16	Nicholas Culbertson	A Decade of Venarterial ECMO Experience in Children and Neonates: Bucking the National Trend
17	Nicholas Culbertson	Thymectomy for Myasthenia Gravis in Children: A Comparison of Open and Thoracoscopic Approaches
18	Arun Das	The Delivery of Cardiovascular Care is Expensive, but Unique From Other Intensive Care Settings
19	Jacob Dey	Seeing is Believing: A Novel Objective Evaluation of Facial Reanimation Surgery
20	Ali Ghasemzadeh	Management of Pediatric Mandibular Condyle and Subcondyle Fractures: The Algorithmic Impact of Concomitant Mandibular Arch Fractures
21	Katherine Giuliano	Survival Following Lung Metastasectomy in Soft Tissue Sarcomas
22	Andrew Halls	Factor Analysis of the Leyton Obsessional Inventory-Child Version Identifies Pediatric Obsessive-Compulsive Spectrum Symptomatology
23	Andrew Halls	Correlations between NEO personality inventory scores and clinician-reported premenstrual and postpartum mood symptoms
24	Kelly Harris	Characteristics and Outcomes of Renal Cell Carcinoma in the Pediatric and Young Adult Population
25	Ronald Hoard	Monitoring Nerve Regeneration In-Vivo in a Rat Using Diffusion Tensor Imaging
26	Rupert Hung	The Prognostic Value of Exercise Capacity in Patients with Non-Revascularized and Revascularized Coronary Artery Disease: The FIT Project

27	Minh-Huy Huynh	Social Isolation in Baltimore Drug Injection Users and its Implications
28	Ben Janson	The Role of Physician Experience in Pterygium Surgical Outcomes.
29	Rebecca Johnson-Paben	Burden Incurred by Patients and their Caregivers Following Outpatient Surgery
30	Genevieve Kaunitz	Surgical outcomes of infantile hemangiomas receiving propranolol, corticosteroids, or expectant management
31	David Kidd	An assessment of handheld digital manometer accuracy during thoracentesis
32	Anne Kuwabara	Retrospective Study: Natural History of Uncomplicated, Viral Warts in Children
33	Ryan Lange	Investigation of Circulating Proteins as Biomarkers for Malignant Gliomas
34	Abby Larson	Cost Analysis of Endoscopic-Assisted Suturectomy with Postoperative Helmet Molding and Open Cranial Vault Repair of Sagittal Synostosis
35	Alexander Leyva	Electroencephalographic sleep as a new marker of good outcome in patients with acute encephalopathy: a 4-year observational study
36	Jana Lovell	Longitudinal assessment of cognitive status and HAART treatment in an HIV-positive outpatient setting at the Johns Hopkins Hospital
37	Rebeccah McKibben	Elevated Levels of Monocyte Activation Markers Are Associated With Subclinical Atherosclerosis in the Multicenter AIDS Cohort Study (MACS)
38	Alexandra Miller	Perioperative low arterial oxygenation is associated with increased risk of stroke after cardiac surgery
39	Juan Munoz	Extent of resection and residual volume thresholds affecting survival for patients with repeat resection of glioblastoma
40	Lynn Pauls	The Impact of Weekend Admissions on In-hospital Mortality: A Systematic Review
41	Thomas Rappold	Serum Biomarker Levels And Risk For Brain Injury after Cardiac Surgery
42	Ankita Saxena	Implications of Pre-operative Polysomnography Parameters for Post-operative Respiratory Complications in Children undergoing Adenotonsillectomy

43	Andrew Scott	Perioperative Thermoregulation Compliance Effectively Prevents Hypothermia
44	Jessica Selter	Can you fine-tune the ketogenic diet in pediatric epilepsy?
45	Debebe Theodros	Efficacy of Primary Microvascular Decompression versus Subsequent Microvascular Decompression for Trigeminal Neuralgia
46	Alan Utria	What is the Optimal Age for Cranial Vault Remodeling in Syndromic Craniosynostosis?
47	Johnny Xie	The Difficult Airway Response Team (DART): A Five-year Overview of an Intervention to Manage In-hospital Airway Emergencies
48	Jennifer Yeh	Weaning of Home Oxygen in Infants with Bronchopulmonary Dysplasia
49	Mingjuan Zhang	Single Intraocular Pressure Measurements Cannot Approximate the Mean of Multiple Same-Day Measurements in Glaucoma Surgical Trials
50	Jiawei Zhao	Pseudoisochromatic plate testing: are we measuring color vision or something else?

HISTORY OF MEDICINE

51	James Aluri	The Role of the Humanities in Medical Education: Thoughts from William H. Welch
52	Michael Claiborne	Alternative Medicine in Maryland: Institutional Philosophy and Program Development
53	Jesse Cohen	The Didactic Diagram: What the Acid-Base Nomogram Can Teach Us About Information Technology in Health Care
54	Alim Ramji	Montaña de Monserrate's Libro de la Anathomia del Hombre, Galenism explored through dream"

MEDICAL HUMANITIES, BIOETHICS, and the HEALING ARTS

#	Name	Title
55	Benjamin Bautz	Can Beauchamp and Childress Justify Their Famous Principles of Biomedical Ethics? Why a More Complete Common Morality Theory Is Needed
56	Zachary Enumah	Refugee Perceptions of Healthcare: A Participatory Assessment of Healthcare Delivery, Nyarugusu Refugee Camp, Kigoma, Tanzania
57	Mariam Fofana	"Subject to the same diseases, Heal'd by the same means?": Race and American Medicine
58	Alicia Gaidry	Influences on Naval Physicians' Ethical Decision-Making: The Contributions of Pre-Deployment Ethics Training
59	Katharine Press	What Patients with Addiction Disorders Need from their Primary Care Providers: a Qualitative Study
60	Julia Riddle	Painkillers, Transactional Sex, and Exotic Dance Clubs in Baltimore, MD
61	Samuel Scharff	“Essence to Essence”: Reclaiming personal and professional identity through creative expression.
62	Giselle Zornberg	“Exchanging Realities”: Impact of a Diverse Learning Environment on Brazilian Participants of a Tuberculosis Research Development Course

PUBLIC HEALTH and COMMUNITY SERVICE

#	Name	Title
63	Nancy Abu-Bonsrah	Assessing The Nature Of Global General Surgical Education
64	Breanne Britton	Are Surgeons Aware of Racial Disparities in Surgical Care and Outcomes?
65	Bryn Carroll	A Prevalence Survey of TB Among DM Patients in South Africa

66	Lisa Chen	Reading Functions in One Eye versus Both Eyes Open in Neovascular Age-related Macular Degeneration and Their Associations with Patient-reported Vision Related Function Using NEI VFQ-25
67	Zachary Enumah	Does Knowing One's Right to Health Facilitate Higher Demand for Access to Essential Medicines? An Examination of Community Empowerment in Gulu District, Uganda
68	Antony Kironji	Using the Delphi Method to Identify Best Practices for Analyzing Trauma Using Large Trauma Registries
69	David Li	Sexual orientation and alcohol use among adolescents and young adults in Thailand
70	Juliana Macri	A Quality Improvement Project to Enhance Care Coordination and Referral Tracking in a Community Health Center Setting
71	Dane Moran	Injury patterns and Helmet Use among Motorized Two-Wheeler Road Users in Hyderabad, India
72	Steven Pennybaker	The effect of long-term amphetamine treatment for ADHD on impulsivity, delayed-discounting, and sexual discounting as assessed using the crowdsourcing platform Mechanical Turk.
73	Joshua Posen	What factors define a successful Accountable Care Organization and may be applied to the Health Links program in Ontario, Canada? A review of the literature from Key Opinion Leaders.
74	Sarah Saleemi	Histological changes in the rat model of Neurocysticercosis suggest demyelination
75	Andrew White	Application of the WHO Child Growth Standards: Measuring the Double Burden of Malnutrition in Ecuador

2013 MSRD Student Awardees

HOWARD CHOI
Harold Lamport Research Scholar
Cost-effectiveness of Xpert MTB/Rif for Diagnosing Pulmonary Tuberculosis In The United States

JACOB RUZEVICK
Henry Strong Denison Research Scholar
Erlotinib Inhibits Growth In A Primary Mouse Xenograft Model of Chordoma

LAUREN THOMAIER
W. Barry Wood, Jr. Research Scholar
Assisted Reproductive Technology: Is There A Biological Plausibility For Increased Risk in Autism Spectrum

TAMARA ASHVETIYA
Excellence in Medical Student Research
Implantable Bioreactors for the Delivery of Stem Cell-Derived Cytokines to the Post-Infarct Heart

KEVIN CONTRERA
Excellence in Medical Student Research
Rates of Long-Term Cochlear Implant Use in Children

FIDEL A. DESIR
Excellence in Medical Student Research
Survey of Partner Notification Practices for Sexually Transmitted Infections in the United States

MAIMON HUBBI
Excellence in Medical Student Research
Lysosomal Degradation of HIF-1α Represents a Novel Therapeutic Target

JOSEPH KLEMBCZYK
Excellence in Medical Student Research
Importance of Environmental Conditions in Lusaka, Zambia's Seasonal Cholera: A Mathematical Analysis

RHIANON LIU
Excellence in Medical Student Research
"Am I Cut Out for This?": A Qualitative Analysis of Doubt Among First-Year Medical Students.

CECILLIA LUI
Excellence in Medical Student Research
Mutations in Alstrom Protein Promote Persistent Postnatal Cardiomyocyte Replication in Multiple Families

TYLER MAINS
Excellence in Medical Student Research
Isolating the Impact of Audience Response Systems on Learning

JULIE NG
Excellence in Medical Student Research
IgE-Independent Hypersensitivity Reactions are Associated With Prolonged Survival in Advanced Pancreatic Cancer Patients Receiving a GM-CSF Cell-Based Vaccine Plus Cyclophosphamide (Cy) and Detuximab

SARAH WALLACE
Excellence in Medical Student Research
Quantifying the Effect of Cardiopulmonary Resuscitation Quality on Cardiac Arrest Outcome: A Systematic Review and Meta-Analysis

JOSHUA WATSON
Excellence in Medical Student Research
Efficacy of the Orally Delivered Anti-Parasitic Mebendazole in an Intracranial Rodent Gliosarcoma Model

Acknowledgements

The MSRD Organizing Committee would like to thank the following people for their support putting this event together. Without their help, this day would not have been possible.

Faculty Judges

The Office of Student Affairs

Doug Hughes

Victor Raspa

John Steele

Mark Dodd

The Scholarly Concentrations Faculty

2014 MSRD Organizing Committee

Carol Li, Co-Chair

Ali Ghasemzadeh, Co-Chair

Janet Choi

Amanda Sun

Michele Massa

Dr. Mary Catherine Beach

Dr. Thomas Koenig

PODIUM PRESENTATION ABSTRACTS

Listed Alphabetically

Marcelo Cerullo, MS2 Mentor: Adil Haider, MD

Podium Presenter, Public Health and Community Service

Faster is Better: Enhanced Enrollment in Public Insurance Programs Reduces Pediatric Mortality following Traumatic Brain Injury

Background: Uninsured children with traumatic brain injury (TBI) suffer higher in-hospital mortality compared to children with insurance. Though every state has set up its own Children's Health Insurance Program (SCHIP), enrollment rates have varied. Our study investigates how differing state-level enrollment rates influences the effect of insurance status on TBI-related mortality in children.

Methods: Enrollment into SCHIP from 1999 to 2011 was calculated using state-level insurance data from the US Census Bureau. For each state, the Savitzky-Golay smoothing algorithm was used to calculate the rate of change of enrollment across years. To evaluate the effect of insurance status on pediatric TBI outcomes, discharge records of patients age 0-20 years with ICD-9 codes for TBI from the 2009 Kids' Inpatient Database were used. The effect of insurance status and state enrollment rate on TBI-related pediatric mortality was evaluated by logistic regression, adjusting for age, sex, race, new injury severity score, income quartile, and hospital characteristics (urbanicity, teaching status, and management). A hierarchical model was then constructed to evaluate the effect of enrollment rates on the effect of insurance status.

Results: 23,799 patients with TBI in 40 states met inclusion criteria. Uninsured children had 1.61 (95% CI: 1.26-2.05) times greater adjusted odds of mortality compared to insured children. Each point increase in a state's enrollment rate was associated with a 95% decrease in odds of mortality (OR=0.05, 95% CI: 0.003-0.91). In the hierarchical model, uninsured children continued to demonstrate greater odds of mortality compared to insured children (OR=1.64, 95% CI: 1.28-2.10).

Conclusions: This study corroborates previous investigations into the effect of insurance status on pediatric TBI mortality. However, in states that enroll children more slowly into public insurance programs, this effect is magnified. This suggests that increasing the rate of expansion of public insurance programs may be an effective method to reduce pediatric TBI disparities.

Kevin Curtiss, MS2 Mentor: Mohamad Allaf, MD

Podium Presenter, Clinical Research

A comparison of minimally invasive approaches to partial nephrectomy: a multi-surgeon analysis from a large tertiary care center

Background: Both laparoscopic partial nephrectomy (LPN) and robotic partial nephrectomy (RPN) offer a minimally invasive approach to nephron sparing surgery. Previous studies have shown an improvement in perioperative outcomes associated with RPN over LPN; however these studies have generally been confined to small, single-surgeon series. We compare perioperative outcomes of LPN and RPN in a large multi-surgeon tertiary care center.

Methods: Our institutional database was queried for LPN and RPN performed between 2003 and 2013. Patient demographics, tumor characteristics and perioperative outcomes were compared for each group. Patients who had more than one tumor clinically were excluded from warm ischemia time (WIT) calculations. Calculations for total operative time excluded patients who underwent planned second procedures.

Results: A total of 837 consecutive patients from 18 surgeons were identified, with 522 and 315 undergoing LPN and RPN respectively. The majority of cases (93.7%) were performed by 5 high volume surgeons as defined by having at least 25 partial nephrectomies. There was no significant difference in age, body mass index, gender, American Society of Anesthesiologists classification or R.E.N.A.L nephrometry score between the LPN and RPN groups. Tumor size was significantly larger in the RPN group (2.5cm vs. 2.3cm, P=0.04). The RPN group had significantly lower estimated blood loss (100mL vs. 200mL, P<0.0001), operative time (162min vs. 183.5min, P<0.0001), WIT (17min vs. 25min, P<0.0001), positive margin rate for renal cell carcinoma (1.0% vs. 5.0%, P=0.002), and open conversion rate (1.9% vs. 5.1%, P=0.004). Subset analysis limited to high-volume surgeons showed similar results.

Conclusions: RPN is associated with lower blood loss, operative time, WIT, open conversion rate and positive margin rate when compared to LPN. In this series including multiple surgeons highly experienced in both approaches, RPN outcomes are favorable. Further investigation is required to make definitive conclusions regarding oncological efficacy.

Nicole Jiam, MS2 Mentor: Richard Huganir, PhD

Podium Presenter, Basic Science

Sorting nexin 27: A fundamental mediator of AMPA receptor trafficking and synaptic plasticity

Abstract: Ionotropic glutamate receptors are tetrameric channels located in neuronal post-synaptic terminals. Of the ionotropic glutamate receptors, AMPA-type glutamate receptors (AMPARs) are the major excitatory receptors for the brain and important for synaptic transmission. As with most receptors, AMPAR synaptic levels are dynamic and regulated by endosomal trafficking. These fluctuations in AMPAR expression are crucial for human capacity for learning and memory; diseases such as Alzheimer's are associated with synaptic AMPAR dysfunction. However, the mechanism underlying AMPAR receptor trafficking remains unclear. Recent evidence suggests sorting nextin 27 (Snx27) may be a key molecular agent in Down syndrome pathogenesis and AMPAR trafficking. Within the sorting nexin family (defined by a characteristic PX domain), Snx27 is the only member to carry a PDZ domain protein. We speculate a role for PDZ in receptor trafficking. However, the molecular interactions between AMPAR subunits and Snx27 have not been elucidated. In this study, we hypothesize that Snx27 interacts directly with AMPAR through its PDZ domain. Using co-immunoprecipitation, knock-ins, and imaging techniques, we identify the domains involved in the direct interaction between Snx27 and AMPAR. We demonstrate an increase in AMPAR surface expression with Snx27 overexpression. Moreover, modifications to the PDZ (H112A) and the PX (delta PX) domains negatively alter AMPA receptor binding and reduce AMAPR surface expression. Mutations in the AMPAR subunits also disrupt Snx27 binding. Our novel study establishes the PDZ and PX domains as necessary and sufficient constructs in AMPAR endocytic sorting and trafficking. These molecular findings will champion targeted therapies for receptor trafficking-related disease such as Down syndrome. Our study limitations arise from looking at only one protein-protein interaction. miR-155 is a chromosome 21-encoded microRNA that negatively regulates a Snx27 transcription factor. Future studies should investigate whether miR-155 overexpression is sufficient to evoke a phenotype via exogenous delivery on a plasmid.

Diane Kuhn, MS2 Mentor: Jeremy Greene, MD PhD

Podium Presenter, History of Medicine

The Rise of Leishmaniasis in Rio de Janeiro in the Context of Political Decentralization

Background: Leishmaniasis is a neglected infectious disease considered to be endemic in 88 countries, with more than 350 million people at risk and more than 2 million cases reported annually. Brazil is one of the most severely affected countries, with more than 600,000 leishmaniasis cases reported since 1990. The vast majority of these cases are cutaneous leishmaniasis. The purpose of my project is to explain the increase in cutaneous leishmaniasis cases in the area of Rio de Janeiro since the 1980s, and to evaluate efforts at controlling the disease.

Methods: Through stakeholder interviews conducted in Portuguese, the review of public health records held at the Oswaldo Cruz Institute in Rio, and analysis of government data and secondary sources, I argue that an important and overlooked factor explaining the rise of leishmaniasis in Rio since the 1980s was the decentralization of the health system.

Results: As part of the mandate of Brazil's first democratic constitution in 1988, much of the burden of executing health services fell for the first time to the municipal level. Municipalities had intimate knowledge of local health needs, but in many cases they lacked the technical expertise and experience to execute successful prevention and treatment plans. My argument does not eschew other important considerations in the rise of leishmaniasis, such as the declining use of the DDT vaccine, decreasing federal funding, and migration of Brazilians from tropical areas. Instead, it seeks to complement these explanations with a narrative of how the politics of decentralization can have a dramatic impact on public health outcomes.

Conclusions: The lessons of leishmaniasis spread and control in Rio de Janeiro over the past 25 years offer insight into the way that political change and decision making should be of central concern during an era of health reform throughout the world.

Dinah Lewis, MS2 Mentor: Geetanjali Chander, MD MPH

Podium Presenter, Public Health and Community Service

Unintended sexual consequences of drinking among women attending an urban STI clinic

Background: Urban women in areas with high rates of violence and HIV and sexually transmitted infections may be particularly vulnerable to the sexual consequences of risky drinking. Yet, in-depth explorations of the sexual consequences of drinking are lacking in the literature. The few existing qualitative analyses on alcohol use and sexual activity have been limited to specific populations including men who have sex with men, adolescents, and college students. This analysis sought to fill this gap by exploring unintended sexual events occurring while drinking among a particularly at-risk clinic population: urban women attending a public STI clinic.

Methods: In-depth interviews were conducted with 20 sexually active adult women attending the Baltimore City Health Department Eastern STD Clinic who reported either binge drinking in the past six months or engaging in vaginal or anal intercourse while under the influence of alcohol. Transcribed interviews were reviewed and coded iteratively using a grounded theory approach. Data were primary managed in Excel. Representative participant quotations were used to illustrate each emergent theme.

Results: Five unintended sexual consequences of drinking emerged: sex with new/unknown partners; non-normative sexual activity, including group sex, anal sex and “rough” sex; blacked-out sex, or being unable to recall sexual activity the following morning; unprotected sex; and rape. Sexual victimization was a common thread throughout multiple themes.

Conclusions: In summary, we found that among this sample of women attending an urban STI clinic, alcohol use was associated with a variety of -often dangerous- unintended sexual consequences that increase exposure to emotional and physical harms. Minimizing these consequences through targeted interventions may not only reduce rates of HIV and STIs, but could also reduce sexual victimization and the emotional consequences that follow.

Tina Munjal, MS2 Mentor: Charles Limb, MD

Podium Presenter, Clinical Research

Use of the Phantom Electrode Strategy to Improve Bass Frequency Perception For Music Listening in Cochlear Implant Users

Background: Low-frequency hearing in cochlear implant (CI) users has previously been limited by electrode length and insertion depth, factors which determine the extent to which apical cochlear stimulation can be achieved. Partial bipolar stimulation, a method of current steering, has been shown to generate a pitch percept lower in frequency than the most apical physical electrode, in essence creating a "phantom" electrode (PE). The objective of this study is to determine the effect of PE on CI users' perception of bass frequency information in music.

Methods: Eleven Advanced Bionics CI users and ten normal hearing (NH) controls offered sound quality ratings for seven versions of each of 25 musical segments, a test called CI-MUSHRA (MUltiple Stimulus with Hidden Reference and Anchor). Five versions were filtered to remove increasing amounts of bass frequency information, one version was highly altered, and one was unaltered. CI users' performance on the CI-MUSHRA, both with and without partial bipolar stimulation, was captured as mean deviation from performance by NH listeners on the task.

Results: Partial bipolar stimulation of the most apical electrode reduced CI users' deviation from NH listeners on the CI-MUSHRA by an average of 5.92 points (Paired $t(10) = 2.88$, $p = 0.016$ (two-tailed), 95% confidence interval [1.3378, 10.4955]). On average, PE also reduced CI users' deviation from NH listeners in graphical representations of CI-MUSHRA performance. This suggests that the phantom electrode improves CI users' perception of bass frequency information in musical stimuli.

Conclusions: Creation of a phantom electrode percept through partial bipolar stimulation of the most apical electrode appears to improve CI users' perception of bass frequency information in music, contributing to greater accuracy in the ability to detect alterations in musical sound quality. The phantom electrode processing strategy may enhance the music listening experience without the need for a longer electrode or deeper insertion.

Alexandra Robison, MS2 Mentor: Renee Boss, MD

Podium Presenter, Medical Humanities/Bioethics

Incorporating Discussions of Spirituality and Religiosity into NICU Family Meetings

Background: Stress and anxiety are commonly experienced by families of critically ill infants. Despite medical advances, numerous babies remain at risk of serious complications including mental retardation, physical disability, and death. Many families turn to religious or spiritual beliefs for comfort, strength, and hope. As part of a larger study about parent-clinician decision-making for critically ill infants, we explored how religion and spirituality are incorporated into NICU family discussions.

Methods: Eighteen parent-provider discussions were recorded, encompassing prenatal consultations and postnatal family conferences in the Neonatal Intensive Care Unit. After each discussion, one physician, one nurse, and up to two family members completed a survey. Transcriptions were analyzed for religious and spiritual themes. Survey data were analyzed using descriptive statistics. Family satisfaction with ICU care was assessed using the FS-ICU-DM©.

Results: Religion and/or spirituality were discussed in 8/18 conversations. In 7/8, physicians estimated chance of survival without serious disability for these infants (the discussed group) to be <10%, compared to 1/10 infants given a similar prognosis in the non-discussed group. Conversely, there was greater parent-clinician discordance about prognosis in the discussed group (6/8 parents more optimistic than providers) versus the non-discussed group (3/10). The average FS-ICUDM© score of families in the discussed group was 92.9, versus 74.7 for the non-discussed group. One physician in the discussed group was religious versus 4/10 in the non-discussed group. Connection and values were the predominant spiritual themes identified. Religious beliefs and prayer were rarely overtly mentioned.

Conclusions: We found that parents who had discussions with providers regarding religion or spirituality reported higher satisfaction with their child's medical care, even though these children were, on average, more critically ill. These families were more likely to be more optimistic than providers about infant outcomes. Religious physicians did not talk about religion more than non-religious physicians.

Sepehr Tehrani, MS2 Mentor: Gerald Brandacher, MD

Podium Presenter, Basic Science

Selectively Permeable Nanofiber Constructs To Prevent Inflammatory Scarring And Enhance Nerve Regeneration in Peripheral Nerve Injury

Background: The current approach to nerve repair after severing injury involves suturing the two separated ends of the nerve. Despite the best microsurgical technique and prompt timing of repair, functional recovery of the area supplied by the damaged nerve has been unsatisfactory. It has been demonstrated that inflammatory and fibrotic processes that cause scarring at the repair site impede nerve regeneration, a primary determinant of functional outcomes. We hypothesized that mitigating the scarring that occurs between the anastomosed ends of the damaged nerve would promote better nerve regeneration.

Methods: In order to test our hypothesis, we obtained a nanofiber construct with pores 10 micrometers in diameter, allowing it to be permeable to growth factors and other neurotrophic factors but impermeable to the movement of fibroblasts and macrophages, cells involved in scarring. Two groups of eight rats each had their right sciatic nerves surgically severed and repaired by anastomosis. The experimental group had the site of anastomosis wrapped with the nanofiber construct. At 5 weeks post-operation, the nerves were reclaimed for histologic analysis. Masson's Trichrome staining was done to assess for collagen deposition, an indicator of fibrosis, and immunofluorescence was used to detect macrophage invasion. Staining was done to detect myelinated axons.

Results: Longitudinal nerve sections showed a significantly decreased level of scarring and inflammation in the experimental group, as determined by collagen quantification (7.4% ± 1.3 vs. 3.2% ± 1.3, $p<0.05$) and macrophage counting (32.2 ± 2.4 cells/mm2 vs. 14.6 ± 1.8 cells/mm2, $p<0.05$). Staining also revealed collagen trapped outside the nanofiber wrap. Nerve cross sections taken five millimeters distal to the repair site demonstrated a significantly increased number of myelinated axons in the experimental group.

Conclusions: These results suggest that a nanofiber wrap applied to a nerve repair site can protect from inflammation and scarring, promoting better nerve regeneration and functional outcomes.

Sharon Weeks, MS4 Mentor: Eric B Schneider, PhD

Podium Presenter, Clinical Research

A modified Kampala Trauma Score (KTS) outperforms the Injury Severity Score (ISS) in trauma mortality prediction

Background: Mortality prediction in trauma patients has relied upon injury severity scoring tools focused on anatomical injury. This study sought to examine whether an injury severity scoring system which includes physiologic data performs as well as anatomic injury scores in mortality prediction.

Methods: Using data collected from 18 Level I trauma centers and 51 non-trauma center hospitals in the US, anatomy based injury severity scores (ISS), new injury severity scores (NISS) were calculated as were scores based on a modified version of the physiology-based Kampala trauma score (KTS). Because pre-hospital intubation, when required, is standard of care in the US, a modified KT S was calculated excluding respiratory rate. The predictive ability of the modified KTS for mortality was compared with the ISS and NISS using receiver operating characteristic (ROC) curves.

Results: A total of 4,716 individuals were eligible for study. Each of the three scores was a statistically significant predictor of mortality. In this sample, the modified KTS significantly outperformed the ISS (AUC=0.83, 95% CI 0.81-0.84 vs. 0.77, 95% CI 0.76-0.79, respectively) and demonstrated similar predictive ability compared to the NISS (AUC=0.83, 95% CI 0.81-0.84 vs. 0.82, 95% CI 0.80-0.83, respectively).

Conclusions: The modified KTS may represent a useful tool for assessing trauma mortality risk in real time, as well as in administrative data where physiologic measures are available. Further research is warranted and these findings suggest that the collection of physiologic measures in large databases may improve outcome prediction

Jonathan Yeh, MS2 Mentor: Thomas Smith, MD

Podium Presenter, Clinical Research

Using a Question-Prompt List as a Communication Aid for Advanced Cancer Care

Background: Oncologists and patients often avoid discussing prognosis, treatment failure, and end-of-life planning. Thus, many patients with advanced cancer still overestimate their prognosis and possibility of cure, impairing decision-making. We piloted a question-prompt list (QPL) covering these issues in order to determine how it would be used and received by new oncology patients, and whether it would impact patient anxiety and satisfaction with the consultation.

Methods: A one-page checklist of common questions surrounding cancer care, quality of life, and end of life was created from previous instruments. 30 patients with advanced or metastatic head/neck cancers were recruited from outpatient clinics at Johns Hopkins. Patients received the QPL before their initial consultation. Pre- and post-visit anxiety, satisfaction, and information/decision-making preferences were assessed using validated instruments. Patient opinions regarding the QPL were solicited through Likert-scale items.

Results: 27 of 30 patients (90%) used the QPL during the visit, but notably, none shared it directly with their oncologist. The vast majority of participants agreed that the QPL was “relevant” and “helpful” (90%) and recommended that more doctors use this sort of list (90%), while disagreeing that the QPL made them feel anxious (80%). Generally, participants were highly satisfied with the consultation, and their anxiety decreased during the visit ($p < 0.005$).

Conclusions: A simple, one-page communication aid addressing cancer treatment, prognosis, quality of life, and end-of-life issues was well-received and highly recommended by new oncology patients. It did not negatively impact patient anxiety/satisfaction or physician workflow. Interestingly, most patients used the QPL but did not freely share it with their oncologist, underscoring the continuing importance of physician initiative in improving communication. Follow-up studies will determine whether use of the QPL increases knowledge, facilitates decision-making, and improves advance care planning.

ORAL PRESENTATION ABSTRACTS

Listed Alphabetically

Nicholas Abt, MS2 Mentor: Gedge Rosson, MD

Oral Presenter, Clinical Research

Neoadjuvant Chemotherapy is Associated with Decreased Morbidity amongst 77,958 Patients Undergoing Mastectomy-only and Immediate Tissue Expander Reconstruction

Background: Neoadjuvant chemotherapy (NC) is being increasingly utilized in breast cancer patients and there are limited evidence-based data related to its independent effects on morbidity after mastectomy and immediate reconstruction. Our objective was to determine the impact of neoadjuvant chemotherapy on 30-day postoperative morbidity in women undergoing mastectomy with or without immediate reconstruction.

Methods: We analyzed data from females undergoing mastectomy with or without immediate reconstruction from 2005-2011 in the National Surgical Quality Improvement Program databases. Patients having undergone neoadjuvant chemotherapy were compared to controls and multivariable regression was used to evaluate 30-day postoperative overall morbidity following mastectomy with or without immediate breast reconstruction. Morbidity included events affecting: cardiac, respiratory, neurological, urinary, venous thromboembolism, wound, and prosthesis/flap failure complications.

Results: 85,851 patients were analyzed; 7,893 patients were excluded due to missing exposure data. The mastectomy-only population included 66,593 (77.57%) patients with 2,876 (4.32%) receiving neoadjuvant chemotherapy. The immediate breast reconstruction population included 19,258 (22.43%) patients with 820 (4.26%) receiving NC. We present unadjusted and adjusted odds ratios (OR). Following univariate analysis, NC was associated with a lower overall morbidity in the mastectomy-only group (OR_unadjusted=0.80; 95% Confidence Interval [CI]: 0.71-0.91) but had no significant effect in the immediate breast reconstruction group (OR_unadjusted=0.98; CI:0.79–1.23). This observation persisted after extensive adjustment for confounding demonstrating that NC independently was associated with lower overall morbidity in the mastectomy-only group (OR_adjusted=0.67; CI:0.53-0.87) and immediate tissue expander reconstruction subgroup (OR_adjusted=0.43; CI:0.36–0.91).

Conclusions: In our analysis, neoadjuvant chemotherapy decreased the risk of 30-day postoperative morbidity in mastectomy-only and immediate tissue expander reconstruction patients. Additionally, NC does not increase postoperative morbidity in implant and flap breast reconstruction. This is the first study to demonstrate a protective association of neoadjuvant chemotherapy in the breast cancer setting. The mechanisms behind the protective association of neoadjuvant chemotherapy remain unknown and warrant further investigation.

Tamara Ashvetiya, MS3 Mentor: Peter Johnston, MD

Oral Presenter, Basic Science

Age-Related Differences in Paracrine-Mediated Angiogenesis

Background: Evidence suggests many beneficial effects of stem cells are mediated by paracrine action, yet little is known about age-related differences in paracrine-mediated tissue regeneration. We compared paracrine-mediated angiogenesis by young and old mesenchymal stem cells (MSCs) contained in semi-permeable "bioreactor" tubes (500 kDa MW cut-off) that allow free exchange of paracrine factors (PFs), but not cells.

Methods: MSCs isolated from young (6 wk) and old (18-24 mo) C57BL mice were grown in bioreactors at standard culture conditions or at hypoxia (5% O2). Tubes with media alone served as controls. Tubes were exposed to human vascular endothelial cells (HUVECs) and resultant tubule formation (TF) was imaged at 18h. Results were normalized to controls and reported as mean relative TF +/-SD. PF release was quantified via ELISA.

Results: Young mouse MSC PFs induced HUVEC TF in a dose dependent manner (p=0.03). At baseline conditions PFs from young MSCs induced greater TF than old MSCs (p=0.0015). After hypoxia exposure, more TF was induced by both young and old MSCs, but there was no longer a significant difference between young and old (p=0.11). The TF measurements for the various conditions are as follows: 100K young mMSCs normoxia 2.55+/-0.59 (n=4), 200K young mMSCs normoxia 3.55+/-0.62 (n=8), 200K old mMSCs normoxia 2.27+/-0.68 (n=8), 200K young mMSCs hypoxia 4.2 +/-0.32 (n=4), 200K old mMSCs hypoxia 3.65 +/-0.96 (n=8). ELISA assay showed dose-dependent production of VEGF and HGF.

Conclusions: Young MSCs show superior paracrine-mediated angiogenesis compared to old MSCs at baseline. Exposure to hypoxia improved relative PF-mediated angiogenesis by old cells compared to that of young. This may provide a mechanism to optimize PF-mediated regenerative effects of aged stem cells, and deserves further study.

Nathan Bales, MS2 Mentor: Anne Murphy, MD

Oral Presenter, Clinical Research

Retrospective Chart Review for Comparison of Broad Panel and Specific Genetic Testing in Children with Inherited Hypertrophic Cardiomyopathy

Background: Hypertrophic cardiomyopathy (HCM) is a genetic disease of the sarcomere that can be found in both children and adults, and is characterized by thickening of heart muscle. There are many mutations associated with HCM, and genetic testing is often employed in HCM patients and their families. In children who are not the index case of HCM in their families, current recommendations call for genetic testing of only those genes that have been identified as mutated in family members. Although not characterized extensively, clinical experience suggests that de-novo mutations of HCM-related genes in children are possible, as are undiscovered mutations derived from untested parents.

Methods: To determine if younger HCM patients with family histories of HCM should receive broad-panel genetic testing, or testing limited to only familial mutations, a chart review was conducted of all patients who received HCM genetic testing at JHH between 2006-2013. In total, 242 patient charts were analyzed for presence of HCM, age at diagnosis, family history of cardiovascular disease, personal and familial genetic findings, and echocardiogram results.

Results: A total of 81 patients with sarcomere gene mutations were identified. The remainder of patients did not have a mutation identified, or had mutations in genes not related to the sarcomere. Of the 81 patients with mutations, 66 had a clinical diagnosis of HCM. Importantly, 8 patients had >1 pathogenic or likely-pathogenic mutation, including 6 patients who were diagnosed with HCM as children. In this analysis, the likelihood of a child with HCM having more than one mutation is 25% (6/24).

Conclusions: The large number of children with multiple mutations suggests that broad-panel rather than targeted genetic testing is warranted in children with HCM even if they are not the index case. Identification of all genetic contributors to HCM may play an important role in individual and family management of HCM.

Meera Chappidi, MS2 Mentor: Sophie Lanzkron, MD MHS

Oral Presenter, Public Health and Community Service

Sickle Cell Infusion Center For the Treatment of Vaso-Occlusive Crises: Does duration of enrollment alter healthcare utilization and costs?

Background: Johns Hopkins Hospital implemented a new model of service for sickle cell disease (SCD) patients; an outpatient Sickle Cell Infusion Clinic (SCIC) opened in 2008 as an alternative source of urgent care for patients having vaso-occlusive crises (VOCs) in lieu of emergency department (ED) visits. Providers have anecdotally stated SCIC visits result in a lower number of hospitalizations than ED visits. The purpose of this study is to assess trends in healthcare utilization and costs for patients that have been enrolled in the SCIC program.

Methods: Healthcare utilization (number of hospitalizations, ER visits, 30-day hospital readmissions) and insurance payor cost (medical, pharmacy, total) data was collected for 36 patients (average age=32.5, 13 females) enrolled in the SCIC program from 2010 for at least two consecutive years. Wilcoxon signed-rank tests were conducted to determine significant yearly changes in healthcare utilization and costs. GLM regression analysis was conducted to determine significant predictors of total cost. All costs are reported in 2012 inflation-adjusted dollars.

Results: Total cost of care (TCC) fell 20.7% from $81,744 per patient (PP) in 2010 to $64,826 PP in 2012, with a significant decrease from 2011 to 2012 in TCC ($p<0.05$) and hospital readmissions ($p<0.05$). GLM regression showed the only significant predictor of TCC PP was the number of hospitalizations (B=$49,828, $p<0.05$, 95%CI=$1,810-$97,847). From 2010 to 2012 the average number of hospitalizations per year fell 14.7% from 3.81 to 3.25 PP.

Conclusions: The major driver of healthcare costs for SCD patients is inpatient hospitalizations. The cost reduction seen with subsequent years of enrollment in the SCIC program is driven by a decrease in inpatient hospitalization. Access to an infusion center for care of VOC has the potential to significantly decrease healthcare costs for adults with SCD.

Nymisha Chilukuri, MS2 Mentor: Wendy Bennett, MD MPH

Oral Presenter, Public Health and Community Service

The TechMom Study: Use of Health-related Information & Communication Technology (ICT) in Pregnant and Postpartum Women

Background: Pregnancy and the post-partum period provide opportunities for positive health behavior change in women but providers often miss these opportunities. Understanding how low-income, underserved women utilize Internet and Communication Technology (ICT) could inform technology-based interventions to promote behavior change. Differences in ICT usage by race/ethnicity and English proficiency were assessed to tailor ICT-based interventions.

Methods: The TechMom Study was a cross-sectional survey of 247 pregnant or one-year post-partum women from 4 Johns Hopkins outpatient sites. Multivariate logistic regression was performed to determine differences in cell phone/texting, email/internet and social networking (SN) usage by race/ethnicity and English proficiency, adjusting for age, income, marital and insurance status.

Results: Most women were pregnant (83.8%). Proportions of Latino, African-American, Caucasian and women of other races were 28%, 40%, 23% and 9%, respectively. Latinas more often had limited English proficiency than non-Latinas (83.8% vs.1.13%,p=0.000). Compared to African-Americans, Latinas and Caucasians were equally likely to use cell phones (OR 2.257,p=0.426; OR 1,p=0.000) and SN (OR 1.409,p=0.692; OR 0.599, p=0.419), respectively. Latinas were less likely (OR 0.297,p=0.026) and Caucasians were equally likely (OR 1.836,p=0.473) to use email/internet as African-Americans. Latinas were less likely to prefer receiving health information via cell phone (OR 0.374,p=0.072), equally likely via Internet (OR 0.804,p=0.742), and more likely via SN sites (OR 6.845,p=0.002) as African-Americans. Women with limited English proficiency were equally likely to use cell phone (OR 1.05,p=0.962) and SN (OR 1.121,p=0.894), but less likely to use Internet (OR 0.181,p=0.002) as those proficient in English.

Conclusions: Latinas were equally likely to use cell phones and SN but less likely to use e-mail/internet as African-Americans and Caucasians. Women with limited English proficiency were equally likely to use cell phone/texting and SN as those proficient in English. These findings support developing culturally-appropriate text-messaging and SN interventions for women of all ethnicities to promote improved healthy lifestyle behaviors.

Charles Farmer, MS2 Mentor: Allison Agwu, MD

Oral Presenter, Clinical Research

Factors Associated with Early Retention among Non-Perinatally HIV-Infected Youth

Background: The incidence of HIV infection continues to increase among youth infected through risk behaviors, who often face individual and structural barriers to retention in care. Retention is associated with positive clinical outcomes and a decrease in HIV transmission risk behaviors. We evaluated the clinical and demographic characteristics of non-perinatally HIV (nPHIV)-infected youth associated with retention one year after initiating care.

Methods: Retrospective analysis of treatment-naïve nPHIV-infected 12-24 year-old youth presenting for care at 16 U.S. HIV Clinical Sites within the HIV Research Network (HIVRN) between 2002 and 2008. Eligible patients were included if they had at least one CD4 value and an outpatient visit in the first four months after initiating care. Multivariate logistic regression was used to determine associations with retention, defined by the In Care Campaign as having one medical visit during each 4-month period in the first year. The model included age, gender, race and ethnicity, HIV transmission risk, insurance, antiretroviral therapy use (ART) use, CD4, and clinic site.

Results: Of 1,160 nPHIV-infected youth, 74.3% were male, 60.6% were Black, 57.7% had MSM HIV acquisition risk, and 44.6% were retained in care during their first year. Retention in the first year after initiation of care was associated with starting ART in the first year (adjusted odds ratio (AOR): 3.47, 95% confidence interval (CI): 2.57-4.67), Hispanic ethnicity (AOR 1.66, 95% CI: 1.08-2.56), MSM-related HIV transmission (AOR: 1.59, 95% CI: 1.07-2.36), and receiving care at a pediatric site (AOR 5.37, 95% CI: 3.20-9.01).

Conclusions: The high proportion of newly enrolled nPHIV-infected youth not retained one year after entering care is alarming. Our study indicates specific subgroups that are at highest risk of not being retained in care, and therefore likely escape the benefits of being in care, including ART initiation, improved immunologic and virologic outcomes, and decreased risk of secondary transmission

Alexander Fischer, MS2 Mentor: Anna Chien, MD

Oral Presenter, Public Health and Community Service

Adults with previous nonmelanoma skin cancer still suffer from sunburns despite improvements in sun-protection practices

Background: Previous nonmelanoma skin cancer (NMSC) is highly associated with increased risk of subsequent skin cancer, and increasing number of sunburns is associated with increased risk of melanoma, a more deadly form of skin cancer. It is thus especially important for adults with previous NMSC to limit UV radiation (e.g., sun exposure), which is the main controllable risk factor for skin cancer. This study examines sunburn and sun-protection practices in subjects with previous NMSC in comparison to subjects with no history of skin cancer.

Methods: A cross-sectional analysis was conducted on self-reported data from non-Hispanic white adults (54663 with no history of skin cancer and 1099 with previous NMSC) from the 2000, 2005, and 2010 National Health Interview Surveys (NHIS), obtained through a complex, multistage sample design to represent the US civilian non-institutionalized population.

Results: Subjects with previous NMSC were significantly more likely than subjects with no history of skin cancer to apply sunscreen (adjusted OR=2.26, 95%CI=1.86-2.74), wear long sleeves (adjusted OR=1.45, 95%CI=1.23-1.70), and wear a wide-brimmed hat (adjusted OR=1.70, 95%CI=1.45-1.98) on a warm sunny day. Previous NMSC was not significantly associated with a decrease in recent sunburn within the past year (adjusted OR=0.91, 95%CI=0.75-1.10). Among subjects with previous NMSC, the 29.6% who had suffered recent sunburn were less likely to be female (adjusted OR=0.64, 95%CI=0.45-0.91) and older (adjusted ORs of 1.00, 0.58, 0.35, and 0.13 for 18-50, 51-60, 61-70, and 71+ years of age, respectively; p-trend<0.0001) than subjects without recent sunburn. Adjusted models included age, sex, region, skin type, education, and family history of skin cancer.

Conclusions: Despite subjects with previous NMSC reporting more consistent sun-protection practices (i.e., sunscreen and protective clothing) compared to those with no history of skin cancer, a substantial percentage of subjects with previous NMSC still report recent sunburn, especially among men and younger subjects.

Michael Foote, MS2 Mentor: Luis Diaz, MD

Oral Presenter, Clinical Research

CUTAGENE: A new, non-invasive diagnostic method for diagnosing melanoma

Background: Digital PCR can sensitively detect aberrant DNA mutations in human tissue. Current gold standard melanoma screening is highly subjective, invasive, and neglectful of oncogenic information that specifies malignancy and guides therapeutic intervention. Digital PCR analysis of DNA collected from skin cells with non-invasive sampling can provide a descriptive, specific screening technique to characterize melanoma.

Methods: The non-invasive adhesive sampling test (NIAST) was invented and optimized by quantifying the epidermal DNA extraction ability of different sampling techniques with regards to exposure duration, body site location, sampling area, and sampling mechanism. DNA collection ability was assessed with DNA quantification using RipSeqS and Qubit digital PCR.

Our ongoing clinical trial administers the Histoacryl NIAST to 24 patients (12 melanoma, 12 benign nevi) scheduled for a gold-standard skin biopsy. An adhesive sample of the lesion is analyzed for BRAF and TERT mutations indicative of melanoma using BEAMing digital PCR. After the patient's subsequent biopsy and pathological review, the concordance of the NIAST and gold standard biopsy test results will be compared.

Results: Histoacryl NIAST was able to capture 0.40+/-0.13 ng/uL of epidermal DNA from a back nevus, 0,28+/-0.09 ng/uL of DNA from the forehead and up to 1.19 ng/uL of epidermal DNA from upper back skin compared to negligible DNA collection in other methods. Histoacryl NIAST was also the easiest to perform, the least painful, and was efficiently analyzable with Qbit and RipSeq. Data from the clinical trial will be analyzed in December, 2013.

Conclusions: Histoacryl adhesive sampling demonstrated superior non-invasive acquisition of cutaneous DNA based on its consistency in collecting detectable levels of DNA across multiple body areas, ease of use and analysis, and limited side effects. We are hopeful that the ongoing clinical trial will validate this new non-invasive sampling detection method as superior to the current biopsy-based gold standard for diagnosing melanoma.

Fiona Gispen, MS2 Mentor: Frank Lin, MD PhD

Oral Presenter, Medical Humanities/Bioethics

Hearing Loss Associated with Lower Levels of Physical Activity in the Elderly

Background: Identifying modifiable risk factors related to declines in physical activity in older adults is important given the strong association between physical activity and health and mortality. Whether hearing loss is associated with level of physical activity in older adults is unclear.

Methods: We studied 706 adults (70 years and older) enrolled in the 2005-2006 cycle of the cross-sectional National Health and Nutritional Examination Survey who completed audiometric testing and whose physical activity was assessed subjectively with questionnaires and objectively with body-worn accelerometers. Hearing was defined as the speech-frequency pure tone average in the better hearing ear. Self-reported leisure time physical activity and accelerometer-measured physical activity were quantified using MET (metabolic equivalent of task) minutes and categorized into three levels (inactive, insufficiently active, sufficiently active) based on the U.S. Department of Health and Human Services' 2008 Physical Activity Guidelines for Americans. Ordinal logistic regression models adjusted for demographic factors, cardiovascular risk factors, and BMI were used to assess the association of hearing loss with level of physical activity.

Results: Compared to those with normal hearing, individuals with moderate or greater hearing loss had a reduced odds of being in a higher category of physical activity as measured by accelerometer (OR=0.55, 95% CI: 0.32, 0.97) and by self-report (OR=0.63, 95% CI: 0.44, 0.88). Mild hearing loss was not associated with level of physical activity.

Conclusions: Moderate or greater hearing loss in older adults is associated with decreased levels of physical activity independent of demographic factors, cardiovascular risk factors, and BMI. Treating hearing loss in older adults and recommending physical activity in patients with hearing loss are important priorities, and future researchers should work to investigate the mechanistic basis of this association.

Natasha Gupta, MD/PhD or Student in Residence Mentor: Dorry Segev, MD PhD

Oral Presenter, Clinical Research

Actual and Perceived Knowledge of Kidney Transplantation and the Pursuit of a Live Donor

Background: The supply of deceased donor kidneys will not address the current organ shortage. Live donor kidney transplantation (LDKT) offers a much larger

pool of potential organs, but is underutilized, partly due to the challenges many patients face in asking someone to donate. Actual and perceived kidney transplantation (KT) knowledge are potentially modifiable factors that may influence this process. We sought to explore the relationships between these constructs and the pursuit of LDKT.

Methods: We conducted a cross-sectional survey of transplant candidates at our center to assess actual KT knowledge (5 point assessment) and perceived KT knowledge (5 point Likert scale, collapsed empirically to 4 points); we also asked each candidate if they had previously asked someone to donate. Associations between participant characteristics and having asked someone to donate were quantified using modified Poisson regression.

Results: Of 307 participants, 45.4% were female, 56.4% were non-white race, and 44.6% had previously asked someone to donate. In an adjusted model that included both actual and perceived knowledge, each unit increase in perceived knowledge was associated with 1.21-fold (95% CI: 1.03-1.43, p=0.02) higher likelihood of having asked someone to donate, whereas there was no statistically significant association with actual knowledge (RR=1.08 per unit increase, 95%CI: 0.99-1.18, p=0.10). A conditional forest analysis confirmed the importance of perceived but not actual knowledge in predicting the outcome.

Conclusions: Our findings of the independent importance of perceived knowledge in pursuing LDKT are novel to the field of kidney transplantation and are also relevant to other areas where health behavior is important. Educational interventions that seek to increase patient knowledge should also focus on increasing confidence about this knowledge.

Mac Henry, MS2 Mentor: Rosalyn Stewart, MD MS MBA

Oral Presenter, Public Health and Community Service

Improvements in Hemogolobin A1c Testing Rates at Baltimore Healthcare for the Homeless

Background: Glycated Hemoglobin (HbA1c) levels predict disease state and progression in patients with Diabetes Mellitus (DM). Practice guidelines call for regular HbA1c testing; however, testing rates at primary care sites vary. Improvements in HbA1c testing rates have been linked to use of electronic medical records (EMRs). We investigated HbA1c testing rates at Baltimore Healthcare for the Homeless (HCH), and piloted an EMR intervention to improve HbA1c testing rates.

Methods: We analyzed testing rates for 617 HCH patients with diabetes seen in 2012 for any service. We implemented a 2 cycle PDSA intervention in July and August, 2013, to test whether an electronic reminder improved HbA1c testing rates at medical appointments.

Results: In 2012, 57% of patients with diabetes received HbA1c testing, and 40% of anticipated follow-up tests did not occur despite the patient returning to HCH. The testing rate at medical visits during the non-intervention period were 57.1%. After the PDSA cycles the testing rate was 87.3%.

Conclusions: An EMR intervention improved HbA1c testing rates of patients with diabetes seen at medical appointments. Sustainable improvements in HbA1c testing rates across HCH's services will need to be measured over time.

Maimon Hubbi, MS3 Mentor: Gregg L. Semenza, MD PhD

Oral Presenter, Basic Science

Degradation of HIF-1α Through Autophagy is Essential for DNA Replication in Cancer Cells

Background: Hypoxia-inducible factor-1 (HIF-1) is a heterodimeric transcription factor that upregulates the expression of hundreds of genes to coordinate the adaptive responsive to hypoxia. We recently described (Hubbi et al., Sci. Signaling 2013) a novel non-transcriptional function of the HIF-1α subunit as an inhibitor of DNA replication, coupling cellular proliferation to oxygen levels. However, it remains unclear how cancer cells can retain the adaptive response of HIF-1 while continuing to proliferate. We tested the hypothesis that cyclin-dependent kinase (Cdk) activity couples HIF-1α levels to specific phases of the cell cycle through chaperone-mediated autophagy, a novel pathway for HIF-1α lysosomal degradation (Hubbi et al., J. Biol. Chem. 2013).

Methods: We examined the effect of Cdk1 and Cdk2 on HIF-1α protein levels, transcriptional reporter activity, target gene expression, and HIF-1α-mediated inhibition of DNA replication and cell cycle arrest. Both pharmacological and genetic approaches were used to implicate autophagy in this process.

Results: We showed a physical interaction of endogenous HIF-1α with Cdk1 and Cdk2 through co-immunoprecipitation experiments. Cdk1 led to an increase in HIF-1α levels, transcriptional activity, and HIF target gene expression prior to G1 phase, whereas Cdk2 led to a decrease in HIF-1α levels at the G1/S transition, thereby enabling DNA replication. Confocal microscopy showed that Cdk1 and Cdk2 regulate HIF-1α lysosomal degradation, and the effects of Cdk1 and Cdk2 where blocked by pharmacological inhibitors of lysosomal degradation and genetic knockdown of proteins essential for autophagy. Pharmacological and genetic inhibitors of lysosomal function in cancer cells led a decrease in DNA replication which, amazingly, was wholly rescued by HIF-1α knockdown.

Conclusions: Our results show the hitherto unappreciated importance of lysosomal function on cell cycle progression and show this is dependent on degradation of a single protein. These results provide a mechanistic rationale for the use of autophagy inhibitors in cancer therapeutics.

Andrea Jonas, MS4 Mentor: Scott Blackman, MD PhD

Oral Presenter, Clinical Research

Impaired Fasting Glucose is Followed by More Rapid Decline in Lung Function in Cystic Fibrosis

Background: Glucose intolerance in cystic fibrosis (CF) has long been associated with poorer lung function outcomes. Paradoxically, impaired fasting glucose (IFG; glucose 100-125 mg/dl) was correlated with no worse and, in some cases, improved clinical outcomes including FEV1 percent predicted (FEV1pp). Given the important clinical implications of this finding, we studied the effect of IFG on lung function in a cohort of 9,060 participants in the CF Foundation Patient Registry.

Methods: Oral glucose tolerance test (OGTT) and other phenotype data were obtained from the CFF Patient Registry. Individuals with fasting hyperglycemia at the first OGTT were excluded. Cases were defined as any patient with IFG during follow up. Controls were participants with normal fasting glucose who didn't develop IFG. Encounters were censored if participants met OGTT criteria for CFRD or underwent lung transplantation. The analysis was repeated on the subset of 3,305 F508del homozygous participants. Outcomes included FEV1pp at follow up and best-fit rate of change in FEV1pp. Important covariates were adjusted for with multivariate linear regression.

Results: We found 9,060 of 43,284 participants had OGTT data, including 31% with IFG. 1,575 IFG cases had lower FEV1pp than 5,850 NFG controls at follow up (-8.3%, adjusted, $p < 2 \times 10\text{-}16$) and had a steeper rate of decline of lung function (difference = -1.8%/yr, $p < 2 \times 10\text{-}16$). In the F508del homozygote subset (762 cases, 2,543 controls) IFG was associated with lower FEV1pp at follow up (-7.8%, $p < 1 \times 10\text{-}9$) and a steeper rate of decline in lung function (difference = -2.0%/yr, $p < 2 \times 10\text{-}16$). An independent cohort analysis demonstrated that cases had a steeper rate of FEV1pp decline after development of IFG (-2.0%/yr, $p<0.009$).

Conclusions: Impaired fasting glucose in cystic fibrosis was associated with lower FEV1pp and predicted a more rapid decline in FEV1pp.

David Kirby, MS2 Mentor: Richard Semba, MD

Oral Presenter, Public Health and Community Service

Proteome characterization of normal human iris

Background: The iris controls the amount of light entering the eye by varying pupil size and, along with ciliary body, acts as a tissue plain separating the anterior from the posterior chamber. Although the tissue plays a pivotal role in vision, iris proteome has not been well characterized. This study was conducted to gain insight into the proteome of the human iris, allowing for a better understanding of protein function and pathology in the iris.

Methods: Human donor eyes were obtained from the Lions Eye Institute, Tampa, FL. Iris tissue was isolated under dissecting microscope. Tissue was homogenized, cells lysed, and protein extracted using chloroform/methanol extraction. Isolated protein was reduced in DDT, alkylated with iodoacetamide, and digested with trypsin. Recovered protein pellet was resuspended in formic acid, desalted, and submitted to liquid chromatography tandem mass spectrometry (LC-MS/MS).

Results: A total of 904 proteins were identified in human iris tissue by LC-MS/MS. 32.7% of proteins identified had catalytic/enzymatic properties, 28.9% were involved in non-enzymatic molecular binding, 15.9% had structural molecule activity, 5.9% had receptor activity, 5.4% had transporter activity, and 4.8% had enzyme regulator activity.

Conclusions: This proteomic analysis identified 904 non-redundant proteins, which is the first large-scale analysis characterizing the proteome of the human iris. This dataset of the iris proteome will provide a reference for the investigation of protein function in the iris, and the identification of biomarkers associated with diseases affecting the iris.

Robert Lord, MS2 Mentor: Dale Needham, MD, PhD

Oral Presenter, Public Health and Community Service

Patient Employment Losses During 5-Year Follow-Up After Acute Lung Injury

Background: Physical, cognitive and mental health morbidities arising after Acute Lung Injury (ALI) may impact survivors' return to their pre-ALI employment status. However, more detailed data are needed to better understand the long-term employment outcomes of ALI survivors in the US.

Methods: Long-term employment outcomes data were collected from patients who survived ≥2 years after ALI. Data were collected via structured interviews, with a one-time retrospective interview at ≥2 years after ALI and prospective interviews every four months thereafter until 5 years post-ALI. Interview data included occupation, time off work, and full-time or part-time status.

Results: 138 (97%) of 142 two-year ALI survivors completed their retrospective initial interview and enrolled for continued follow-up every four months thereafter, with 127 (92%) of these 138 patients surviving and completing 5-year follow-up. Prior to hospital admission for ALI, 82 of 138 (59%) patients were employed (full- or part-time). At 2-year follow-up, of the 82 patients working prior to ALI, 52 (63%) were not employed. Among these 52 patients, 31 (60%) were receiving disability (71% of whom never returned to work during 5-year follow-up) and 21 (40%) were either unemployed without disability, newly retired, or had another non-employed status (48% of whom never returned to work during 5-year follow up). Only 30 of 82 (37%) working prior to ALI were working at 2 year follow-up, with a median (IQR) time from hospital discharge until return to work of 3 (1, 5) months.

Conclusions: In this multi-site, 5-year study of patients surviving ≥2 years after ALI, approximately two-thirds of previously-employed patients were not employed at 2 years after ALI, with the majority of these patients not working during their entire five-year follow-up. Those patients returning to work were delayed by a median of 3 months after discharge, with 25% delayed at least 5 months.

Albert Lwin, MS2 Mentor: Adil H. Haider, MD MPH FACS

Oral Presenter, Clinical Research

Economics of an Emergency Room Visit After a Minor Injury: The Cost of Not Being Insured

Background: Disparities in trauma outcomes by payer status have been well defined. However, with the implementation of the individual mandate of the Affordable Care Act (ACA) in 2014, patients will soon have to decide between buying insurance or paying a monthly tax for opting out. Yet, the average bill for a routine Emergency Department (ED) trauma visit by payer status still remains unknown. The objective of this study is to quantify and describe the average total ED charges for a trauma patient by payer status.

Methods: Routine ED patients with a primary diagnosis of trauma were selected from the Emergency Department Sample (NEDS) 2006-2010 using ICD-9-CM codes 800-959. The charge in previous years (2006-2010) was converted to 2013 US dollars using Consumer Price Indices. A discharge-weighted generalized linear model was used to determine average charges per patient by insurance status. The model was adjusted for age, gender, admission timing, median household income based on zip code, New Injury Severity Score, mechanism of injury, Charlson Comorbidities Index, and hospital characteristics (location, region, ownership, and teaching status).

Results: A total of 14,496,853 patients met inclusion criteria. The average total ED charges were highest for “no charge” ($1,943.84; 95% 95% Confidence Interval (CI), $1,922.94 – $1,964.75) followed by self-pay ($1872.59; 95% CI, $1869.10 – $1876.08), private ($1775.74; 95% CI, $1773.60 – $1777.88), “other” ($1,695.15; 95% CI, $1,690.73 – $1,699.56), Medicaid ($1,621.20; 95% CI, $1618.34 – $1624.06) and Medicare ($1585.34; 95% CI $1,580.79 – $1,589.90).

Conclusions: ED trauma patients without insurance are at a disadvantage as they have the burden of being charged 5.5% more than privately insured patients and nearly 15.5% to 18.1% (Medicaid and Medicare, respectively) more than the publicly insured. These findings suggest that, with the implementation of the ACA individual mandate in 2014, patients should consider this unequal burden of charges when deciding to opt out of purchasing insurance.

Shalini Moningi, MS4 Mentor: Joseph M. Herman, MD MSc

Oral Presenter, Clinical Research

Impact of a Single-Day Multidisciplinary Clinic on the Management of Pancreatic Cancer: A 6-Year Report

Background: Multidisciplinary clinics are increasingly prevalent in the management of cancer patients and have been shown to improve the accuracy of staging. Herein, we present a 6-year report from the JHH Pancreas Multidisciplinary Clinic (PMDC) and evaluate the impact of a PMDC on the clinical care recommendations of pancreatic cancer patients.

Methods: 1,040 patient records were prospectively collected from 11/2006 to 11/2012. Cross-sectional imaging, pathology, and history were evaluated by a panel of physicians in these respective fields. Changes in diagnosis and/or staging between outside institution and the PMDC were recorded.

Results: Our population of 513 females and 527 males had a median age at diagnosis of 64 years (28-94yrs). 73% had pancreatic adenocarcinoma, 6% had intraductal papillary mucinous neoplasms, 2% had cholangiocarcinomas, and the remainder had other tumor types including neuroendocrine tumors, cystadenomas and insulinomas.

Overall, 319 patients (30.7%) had a change in diagnosis based on imaging studies and/or review of histology that led to changes in treatment recommendations. Review of histology resulted in a change in the pathologic diagnosis for 66 patients. 19% of patients were upstaged and 8% were downstaged based on review of outside and Hopkins imaging studies.

32 patients with initially diagnosed locally advanced pancreatic cancer were found to have resectable disease following PMDC evaluation. 20% underwent surgical resection after being evaluated at PMDC and 95.7% had margin-negative resections.

Seven patients with an original diagnosis of locally advanced malignancy were found to have benign disease after PMDC evaluation. For example, a patient referred for a presumed unresectable malignant pancreatic-tail mass was determined to have pancreatitis.

Conclusions: The single-day PMDC provided a comprehensive evaluation of patients that lead to a change in therapeutic recommendation in 30.7% of patients evaluated. These results highlight the value of a MDC in the management of patients with pancreatic cancer.

Maxine Norcross, MS2 Mentor: Emily Frosch, MD

Oral Presenter, Medical Humanities/Bioethics

Taking the Pulse on Medical Student and Faculty Well-Being: Toward a Comprehensive Wellness Program

Background: Distress and maladaptive coping among medical trainees, and physician burnout, highlight the importance of wellness promotion in medical education. Currently, however, there is no consensus on best practices for student wellness programs. At JHUSOM, we sought to understand student and faculty perspectives on wellness to inform program development.

Methods: A survey was developed to assess the importance of, satisfaction with, and barriers to wellness in 13 domains, and elicit suggestions for student wellness improvement. Online, anonymous surveys were administered to all medical students (N=476) and faculty with prominent teaching roles (N=93). Quantitative data were analyzed with standard statistical methods and content analysis was performed on open-ended responses.

Results: Response rates for students and faculty were 44% (N=210) and 55% (N=51), respectively. The most important domains of well-being for both groups were mental health, personal relationships, sleep, and work performance. Both groups were least satisfied with their physical health including exercise, sleep and nutrition, with lack of time and pressure to work as the biggest barriers. Nearly 25% of students were dissatisfied with their mental health, citing lack of priority among medical professionals as a barrier. Students who self- identified as minority rated relationships with peers and faculty, professional development, creative expression, and spirituality as more important compared to non-minority students, and were less satisfied with their well-being in multiple domains. Suggestions for improvement included greater flexibility in student schedules, faculty role-modeling, and integrating a curriculum on student wellness. Faculty requested better support of faculty well-being as a strategy to ultimately improve student wellness.

Conclusions: Medical students and faculty share similar priorities and challenges to their well-being. The wellness program we develop will likely include 1) physical health interventions for both students and faculty that provide opportunities for mentorship; 2) curricular elements that honor student preferences; and 3) targeted interventions for minority students.

Megan Orlando, MS2 Mentor: Julie Freischlag, MD

Oral Presenter, Clinical Research

Preoperative duplex scanning in neurogenic thoracic outlet syndrome identifies patients with vascular compression

Background: Thoracic outlet syndrome arises from compression of the neurovascular structures passing through the thoracic inlet. The purpose of this study was to determine whether upper extremity venous and arterial duplex scanning in neurogenic thoracic outlet syndrome (NTOS) delineates patients with vascular compression who require surgical intervention.

Methods: We performed a retrospective review of all NTOS patients who underwent first rib resection and scalenectomy (FRRS) at our institution between 2005 and 2013. Abnormal scans were classified as venous compression (VC, >50% decrease in flow in the subclavian vein from adduction to abduction), venous ablation (VA, zero velocity on abduction), arterial compression (AC, >50% increase or decrease in subclavian artery flow), or a combination of compression types (VCAC or VAAC). We analyzed the relationship between duplex scan velocities, demographic and clinical characteristics including history and physical exam results, and clinical outcomes.

Results: Of 316 patients treated for NTOS between 2005 and 2013, 166 (78% female, average age 34, range 13-66) underwent complete preoperative duplex scanning. Abnormal scans were seen in 41% of patients: 18 (11%) had VC, 14 (8.4%) VA, 22 (13%) AC, 9 (5.4%) VC and AC, and 5 (3.0%) VA and AC. 4 patients demonstrated unsuspected chronic venous thrombus. VC patients more often had a preceding trauma ($P < .03$) and experienced a pneumothorax during FRRS (50% vs. 26%, $P < .02$). AC and VAAC patients were younger (29 and 23, $P < .05$). On physical exam, a positive Adson's test frequently predicted compression (76%, N=34). 97% of NTOS patients with venous and/or arterial compression had a successful outcome vs. 95% of patients without compression.

Conclusions: Duplex scanning identifies NTOS patients with venous and/or arterial compression and chronic venous thrombus. The Adson's test often predicts compression when performed. FRRS is even more successful in patients with preoperative compression as seen by duplex scanning.

Brooks Puchner, MS2 Mentor: Akrit Sodhi, MD PhD

Oral Presenter, Clinical Research

Upregulation of angiogenic mediator angiopoietin-like 4 (ANGPTL4) in the vitreous of eyes with proliferative diabetic retinopathy

Background: Diabetic eye disease is the most frequent microvascular complication in diabetic patients and remains a leading cause of severe vision loss worldwide. Although therapies targeting vascular endothelial growth factor (VEGF) have revolutionized the treatment of diabetic eye disease, data from recent multi-centered clinical trials suggest that monthly intraocular injections with an anti-VEGF therapy delays – but does not completely prevent – progression from non-proliferative to proliferative diabetic retinopathy (PDR). These observations support the contribution of additional angiogenic factor(s) to the progression to PDR. In this regard, we have recently demonstrated that angiopoietin-like 4 (ANGPTL4) is a potent angiogenic factor that is upregulated in cell culture and animal models for ischemic retinal disease. To determine whether ANGPTL4 plays a role in diabetic retinopathy progression, we examined protein levels of ANGPTL4 in the vitreous humor of patients with PDR compared to non-diabetic controls.

Methods: Internal review board approval was obtained for this study. PDR patients scheduled for pars plana vitrectomy were consented to collect anterior chamber (aqueous) fluid, a vitreous biopsy, and serum before and/or during their scheduled procedures. Samples were processed, cataloged, and stored at -70°C. Concentrations of ANGPTL4 and VEGF were determined using enzyme-linked immunosorbent assays and compared to non-diabetic controls.

Results: To date, twelve samples from 11 patients with PDR and 17 samples from 17 control patients with non-diabetic ocular diseases have been collected and analyzed. Preliminary results demonstrate that vitreous concentrations (mean +/- SD) of ANGPTL4 are significantly higher in PDR patients (19.8 +/- 10.4 ng/mL) compared to controls (3.0 +/- 2.4 ng/mL) ($P = 0.0001$).

Conclusions: Vitreous concentrations of ANGPTL4 are increased 6-fold in PDR patients compared to controls. If this relationship holds as additional patient samples are collected and analyzed, our results suggest that ANGPTL4 may serve as a therapeutic target for patients with diabetic eye disease.

Mohamud Qadi, MS2 Mentor: Gedge D. Rosson, MD

Oral Presenter, Clinical Research

Are Flaps Really Better Than Implants For Breast Reconstruction In Obese Females? An Analysis Of 89,514 Women Undergoing Breast Surgery From The ACS-NSQIP Database

Background: Obesity is a risk factor for postoperative morbidity after mastectomy with/without reconstruction. Current evidence support the use of flaps over implants for reconstruction in this population. We searched for the reconstruction strategy associated with the lowest 30-day postoperative overall-morbidity, surgical-site morbidity, and reconstruction-failure rates in this population.

Methods: We analyzed all females undergoing mastectomy from 2005-2011 in the ACS-NSQIP databases. Data included demographic, preoperative, and perioperative factors. Patients were stratified by body mass index (BMI), all the overweight (BMI≥25) and obese females (BMI≥30) were identified, and multivariable regression was used to compare 30-day postoperative overall-morbidity, surgical-site morbidity, and reconstruction failure rates between breast-reconstruction procedures.

Results: 89,514 women underwent mastectomy or breast reconstruction and had NSQIP BMI data, including: 65,827(73.5%) mastectomy-only, 19,124(21.4%) immediate breast reconstruction (IBR), and 4,563(5.1%) delayed breast reconstruction (DBR) patients. Overweight was independently associated with higher postoperative overall-morbidity in the mastectomy-only (OR_adjusted=1.12; 95%CI:1.04–1.22, p=0.004) and IBR groups (OR_adjusted=1.34; 95%CI:1.16–1.55, p<0.001), while trending towards significance in the DBR group (OR_adjusted=1.41; 95%CI:0.95–2.11, p=0.08). Obesity was independently associated with higher overall-morbidity in all groups (OR_adjusted=1.91; 95%CI:1.24–2.94, p<0.03). Additionally, multivariable comparison of 30-day postoperative morbidity rates of flaps vs. implants (using tissue-expanders as the reference group) in the 6,427 obese patients undergoing reconstruction, showed that flap reconstructions were associated with higher overall-morbidity (OR_adjusted=1.49; 95%CI:1.31–1.71, p<0.001), higher surgical-site morbidity (OR_adjusted=1.41; 95%CI:1.16–1.72, p=0.001), and higher reconstruction failure rates (OR_adjusted=2.74; 95%CI:2.01–3.75, p<0.001) than implant based reconstructions (Table 1).

Conclusions: Our study brings attention to the overweight population and to a dose response effect of BMI on postoperative morbidity. During the first 30 postoperative days, flap based reconstructions are associated with higher overall-morbidity, surgical-site morbidity, and reconstruction-failure rates compared to implant based reconstructions. The health care cost implications of the higher 30-day postoperative morbidity associated with flap based reconstruction warrant further investigation.

Jesse Qualliotine, MS2 Mentor: Young J. Kim, MD PhD

Oral Presenter, Basic Science

Myeloid-Derived Suppressor Cells Directly Enhance Tumor Proliferation

Background: Myeloid-derived suppressor cells (MDSCs) are a heterogeneous group of immature myeloid progenitor cells implicated in suppressing the host immune response to tumors by inhibiting T lymphocyte proliferation. Although the immunosuppressive role of MDSCs in tumor progression has been studied extensively, there has been limited inquiry regarding the direct effects of MDSCs on tumor proliferation.

Methods: MDSCs and lymphocytes were sorted from peripheral blood freshly obtained from patients with head and neck squamous cell carcinoma (HNSCC) undergoing surgical treatment. HNSCC cell lines were labeled with fluorescent cellular proliferation dye and co-cultured with either the isolated MDSCs, isolated lymphocytes, or alone. After 96-hours, the HNSCC cells were harvested and their proliferation rates were quantified by flow cytometry.

Results: As cells labeled with proliferation dye divide, the dye they contain is split between daughter cells, which attenuates each cell's fluorescence. After 96-hours of incubation, HNSCC cells that were co-cultured with MDSCs contained populations of cells with less fluorescence than either those co-cultured with lymphocytes or those cultured alone.

Conclusions: These preliminary data suggest that MDSCs directly increase the proliferative index of HNSCC tumor cells in vitro, and, importantly, proffer a new means by which these cells affect tumor propagation. Further analysis is ongoing to identify the responsible mechanisms by which MDSCs mediate this direct increase in tumor proliferation.

Adi Rattner, MS2 Mentor: Alan Schwartz, MD

Oral Presenter, Public Health and Community Service

Sleep-Disordered Breathing in High-Altitude Peruvian Communities

Background: Sleep-disordered breathing (SDB) is a highly prevalent condition with major consequences for cardiopulmonary health, public safety, healthcare utilization, and mortality. Hypoxia is a known risk factor for SDB, yet the prevalence and impact of SDB in high-altitude settings remain largely unknown.

Methods: Cronicas is a longitudinal study of noncommunicable diseases in an age- and sex-stratified random sample of 1,000 Peruvian adults (≥35 years) residing at high altitude. Participants were surveyed for sociodemographics, anthropometry, spirometry, and metabolic and inflammatory biomarkers. A convenience sample of 127 participants was recruited for home-based nocturnal physiologic recordings including respiratory effort, flow, oxyhemoglobin saturation and actigraphy. We estimated the prevalence of SDB and examined its associations with traditional risk factors and noncommunicable diseases.

Results: Our sample was middle-aged (57.2±12.2 years), 55.1% male, with mean body mass index (BMI) of 27.3 (SD 4.1). Most participants were urbanites (88.2%). We found several nocturnal respiratory phenotypes, including obstructive sleep apnea (37.8%), central sleep apnea (16.5%), significant isolate oxyhemoglobin desaturation during sleep (1.6%) and wake (1.6%) states, and normal nocturnal breathing (40.2%). The overall prevalence of SDB was 58.7%. SDB was significantly associated with age ($p=0.042$, test for trend in odds), male sex (OR 2.29, 95% CI 1.05-4.99, $p=0.023$), and rural residence (OR 5.84, 95% CI 1.22-55.04, $p=0.013$). SDB was not significantly associated with BMI, COPD, hypertension, cardiovascular disease, diabetes, or depression.

Conclusions: We found a high prevalence of SDB in this high-altitude sample, encompassing several distinct phenotypes. SDB was associated with age, male sex, and rural residence but not BMI or chronic diseases. This pilot study demonstrates the feasibility of home-based nocturnal recordings in this setting, and will guide further investigation in larger representative samples.

Heather Rosengard, MS2 Mentor: Anna Grossberg, MD

Oral Presenter, Clinical Research

Enhanced Imaging of Infantile Hemangiomas by Infrared Thermography

Background: Infantile Hemangiomas (IHs) are the most common tumors of childhood. The subcutaneous and asymmetric components of IHs complicate their measurement. Tools enabling accurate assessment, particularly CT and MRI, are costly and expose infants to radiation and sedation. Ultrasound is highly operator-dependent and does not provide high-resolution quantifiable data. Infrared thermography (IRT) detects small variations in temperature with high spatial and temporal resolution. Due to hypervascularity, IHs have elevated temperature, making bioimaging with IRT possible. To assess the feasibility of using IRT clinically, we measured the size and activity of IHs with IRT.

Methods: Eight patients were imaged with both white-light and infrared cameras. The IR image was mathematically transformed and overlaid atop the white-light image for direct comparison using MATLAB2012. A temperature contour map was generated for each IH. For each lesion, a ratio of IH area measured by IRT as compared to IH area determined from a white-light image was calculated.

Results: The eight patients imaged ranged in age from 1-30 months. Seven patients were female. All IHs were focal; two were superficial, two were deep, and four were mixed. Six IHs were located on the head, one on the back, and one on the arm. Prior to imaging three patients were treated with propranolol, one was treated with Timolol, and four received no treatment. For each IH, the thermal signature (from the IRT images) extended beyond the portion visible in the white-light image. The mean thermal/white light area ratio was 2.52±0.33.

Conclusions: Subcutaneous portions of IHs extend beyond the borders of their superficial components. This subcutaneous vasculature is better measured using IRT as compared to traditional white-light photography. Though limitations in this method were identified, IRT imaging could guide clinical decision-making and provide accurate, quantifiable results for research

.**Jacob Sama, MS2** Mentor: Maunank Shah, MD

Oral Presenter, Clinical Research

Epidemiology of pulmonary (PTB) and extra pulmonary (EPTB) tuberculosis (TB) in Baltimore City.

Background: Baltimore City has a high proportion of patients with immunosuppression that may predispose them to EPTB. The epidemiology of EPTB is not well described in Baltimore city. We sought to determine the proportion of TB cases with EPTB, assess risk factors associated with EPTB, and characterize treatment outcomes among individuals with EPTB.

Methods: Retrospective cohort study of all active tuberculosis cases treated at the Baltimore City Health Department between January 2008 and June 2013. Cases were classified as either PTB alone, EPTB only or both, and we collected demographic and clinical factors to characterize and compare EPTB and PTB, and determine risk factors and treatment outcomes for EPTB.

Results: Among 156 TB cases identified, 59.0% had PTB alone, 28.8% had EPTB alone and 12.2% had both. The median age among all TB cases was 45 years (IQR 30 – 64). The sites of EPTB differed by country of origin (p=0.014); 54.6% of foreign-born (FB) patients with EPTB alone presented with lymphatic TB, compared to only 8.7% of US born (USB) patients, while pleural TB was more common among USB patients (39.1% USB vs. 9.1% FB). Compared to PTB, patients with EPTB alone were less likely to present with cough (31.1% vs. 62.0%, p=0.003), night sweats (11.1% vs. 35.9%, p<0.001) or weight loss (26.7% vs. 44.6%, p=0.007).

Conclusions: We found that nearly forty percent of all TB patients in Baltimore City have some form of EPTB, and patients with EPTB were less likely to present with typical symptoms of TB. Our results highlight the need for clinicians to evaluate for EPTB among TB suspects and to consider EPTB in patients with atypical symptoms. Additional analyses are ongoing to ascertain risk factors and evaluate treatment outcomes among those with EPTB.

Sneha Shah, MS2 Mentor: Steven Yang, MD

Oral Presenter, Public Health and Community Service

Why are Patients being Readmitted after Surgery for Esophageal Cancer?

Background: Readmission post surgery is an unwanted adverse event and costly to the healthcare system. Therefore, we sought to evaluate factors associated with increased risk of readmission post surgery for esophageal cancer patients and characterize the nature of these readmissions.

Methods: A retrospective cohort study was performed in 306 patients with esophageal carcinoma who underwent neoadjuvant chemoradiation followed by esophagectomy between 1993-2012 at Johns Hopkins. Logistic regression was used to identify factors associated with 30-day readmission and to control for potential confounding patient-specific, surgical, and postoperative factors. Variables were collected from electronic patient records and billing information. Readmissions were defined as inpatient admissions to our institution within 30 days after discharge from postoperative stay.

Results: The median age at surgery was 61 years, 89% were male, 86% had adenocarcinoma histology, and 77% of patients had at least one co-morbidity. Operatively, 77% had trans-hiatal surgery and 14% had 3-incision approaches. Median postoperative length of stay (LOS) was 8 days, and 48% had at least one postoperative complication (POC). The 30-day readmission rate was 14.1%.

By univariate analysis, LOS, sex, and having at least one POC were significantly associated with readmission. In multivariate analysis, having at least one POC remained significantly associated with a two-fold increase in risk in 30-day readmission (2.22 [CI 1.02-4.83], p=0.044).

Of the 43 patients who were readmitted, 70% experienced POCs after surgery, while 30% did not. 50% of patients who experienced POCs were readmitted for reasons related to their postoperative complication. For those readmitted patients who did not experience any POCs, 38% were readmitted for concerns related to oral intake.

Conclusions: Complications not adequately managed before discharge may lead to readmission. For the group of patients who were readmitted but had no complications postoperatively, a proportion of the readmissions may have been prevented with enhanced dietary education prior to discharge.

Nathaniel Shalom, MS2 Mentor: Jennifer Coughlin, MD

Oral Presenter, Public Health and Community Service

Biodistribution of [18F]XTRA - A Novel PET Agent for Imaging Extrathalamic α4β2 Nicotinic Acetylcholinergic Receptors

Background: Whole-body PET/CT was used to characterize the biodistribution and radiation dosimetry of [18F](-)-JHU86428 ([18F]XTRA), a specific PET ligand for the α4β2 nicotinic acetylcholine receptor. The α4β2-nAChR is the most prominent nicotinic receptor of the brain, and post-mortem demonstrations of altered densities of ET-nAChRs in neurodegenerative disease and schizophrenia indicate the importance of its imaging. Currently, only three radiotracers, (S)-3-(azetidin-2-ylmethoxy)-2-[18F]fluoropyridine (2-[18F]FA), (S)-5-(azetidin-2-ylmethoxy)-2-[18F]fluoropyridine (6-[18F]FA), and (-)-2-(6-[18F]fluoro-2,3'-bipyridin-5'-yl)-7-methyl-7-aza-bicyclo[2.2.1]heptanes ([18F]AZAN), are available for studying α4β2-nAChRs in the human brain using PET imaging. The available pre-clinical data for the uptake and BP of [18F]XTRA suggest that it is superior to 2-[18F]FA for quantitative PET imaging of the α4β2-nAChR.

Methods: Five healthy control subjects (3 men, 2 women) without nicotine exposure underwent whole-body dynamic PET/CT scans after bolus injection of [18F]XTRA with a maximum activity dose of 10 mCi. Subjects were scanned from head to mid-thigh with 5 passes performed. Total PET acquisition time was approximately 100 minutes with decay correction omitted. Time–activity curves were generated in organs with visible tracer uptake and tissue residence times were calculated. Whole-body dosimetry was calculated using OLINDA 1.1 software.

Results: Radiation dosimetry PET/CT experiments in five human subjects indicated rapid uptake of [18F]XTRA in the brain. The peak was reached in under 15 minutes, with relatively increasing radiotracer activity in the thalamus over time. Acquisition was complete within 100 minutes, with approximately 6.5% of the total injected dose reached at the peak. When compared to 2-[18F]FA, time-activity curves indicate more rapid brain uptake, with a higher fraction of the radiotracer penetrating the blood-brain barrier.

Conclusions: The pattern of [18F]XTRA uptake was similar to other compounds in its class, with preliminary results suggesting improved brain biodistribution kinetics when compared to 2-[18F]FA. Complete data regarding whole body biodistribution and dosimetry are pending.

Ruchi Srivastava, MS2 Mentor: Kimberley Gudzune, MD

Oral Presenter, Public Health and Community Service

Commercial Weight Loss Programs - Which Ones Work?

A Systematic Review

Background: Commercial weight loss programs are popular among overweight adults, yet a 2005 review found little evidence to support their effectiveness. New studies have since tested these programs. We aimed to determine the weight loss benefits among popular commercial weight loss programs.

Methods: We selected 5 programs based on expert recommendations and Internet popularity. We searched MEDLINE from 1/2002-6/2013. We included randomized controlled trials (RCTs) among adults that were ≥12 weeks and compared a commercial program to usual care (UC) or lifestyle counseling. We also included trials from the prior review that met these criteria. Paired investigators screened results to assess eligibility, then abstracted data on study design, population characteristics, and weight. We synthesized data qualitatively by program.

Results: Overall, we included 27 RCTs.

Weight Watchers (WW): As compared to UC, WW groups had 2.2-10% greater mean percent weight loss at all time points (8 RCTs). There were inconsistent effects when comparing WW to counseling (2 RCTs).

Atkins: As compared to counseling, Atkins groups had 0.8-6.2% greater mean percent weight loss at 3-6 months (6 RCTs); however, there were no significant between group differences at 12 months or beyond.

Jenny Craig (JC): One RCT compared JC to UC, where JC resulted in 7.5% and 6.4% greater mean percent weight loss at 6 and 12 months, respectively.

Slim-Fast (SF): As compared to UC, SF groups had 6.3-9.7% greater mean percent weight loss at 3-6 months (4 RCTs). There were inconsistent effects when comparing SF to counseling (3 RCTs).

Nutrisystem: One RCT compared Nutrisystem to UC, where Nutrisystem resulted in 6.8% greater mean percent weight loss at 6 months.

Conclusions: While commercial weight loss programs can help patients lose weight, these programs may not be superior to counseling. Clinicians may consider these programs when clinic-based options are unavailable.

Emma Steinberg, MS3 Mentor: Lisa DeCamp, MD MSPH

Oral Presenter, Public Health and Community Service

"You Can't Play Games When it Comes to Health": The Perspective of Limited English Proficiency Latina Mothers on Overcoming Language Barriers in Pediatric Healthcare

Background: Latino children with limited English proficiency (LEP) parents experience disparities in healthcare access and quality. Bilingual healthcare providers and use of professional interpreters can mitigate disparities. However, patient perspectives on healthcare accommodations for language barriers are rarely examined. Therefore, current policies and programs may not adequately address challenges experienced by LEP parents.

Methods: This study aims to understand LEP parents' experiences of and opinions about accommodation for language barriers during pediatric healthcare encounters. We performed a secondary data analysis of excerpts of 48 interviews that discussed language barriers in healthcare from two qualitative interview studies of the pediatric healthcare experiences of LEP Latina mothers in Detroit and Baltimore. These extracts were coded de novo through an iterative, consensus process to provide an in depth-analysis of participants' experiences.

Results: Mothers had been in the US on average 10 years and 70% had less than a high school education. Most of their children were US citizens and had public health insurance. Mothers described language barriers as limiting knowledge about their child's health and medications, resulting in lingering questions and doubts, feelings of discrimination, and negative impressions of staff. Access to Spanish-speaking providers or interpreters was better in primary care than in specialty or hospital-based care. Most mothers preferred bilingual providers, as they felt less comfortable asking questions with an interpreter and feared poor quality interpretation. Finally, mothers described tenuous access to Spanish-speaking healthcare providers and switching clinics to continue seeing Spanish-speaking providers, which was difficult with public insurance regulations and mothers' time and transportation constraints.

Conclusions: LEP Latina mothers experienced sub-optimal accommodation for language barriers, resulting from insufficient supply of bilingual providers, limited interpreter availability, and decreased satisfaction with interpreters. Increasing interpreter availability and attention to the technical and relational quality of interpreted encounters may improve healthcare quality for LEP patients.

Joshua Trebach, MS2 Mentor: Khalil Ghanem, MD

Oral Presenter, Clinical Research

Extragenital Gonorrhea and Chlamydia in Exposed Women Attending Two Baltimore City Sexually Transmitted Diseases Clinics

Background: Recommendations from the CDC call for pharyngeal screening of Neisseria gonorrhoeae (GC) and rectal screening of GC and Chlamydia trachomatis (CT) in HIV-infected and at-risk men who have sex with men (MSM). There are currently no recommendations to routinely screen women at extragenital sites. Our aim was to define the prevalence of extragenital GC and CT in women accessing care at two public STD clinics in Baltimore and compare it to the prevalence of extragenital infections in MSM and men who have sex with women (MSW).

Methods: All patients who reported extragenital exposures between 6/1/2011 and 5/31/2013 were included in this analysis. We used logistic regression models to identify risk factors for extragenital infections. Point estimates with 95% confidence intervals (CI) are presented.

Results: A total of 10,539 patients were included in this analysis (88% African American, mean age 29 years, 42% women, 7% MSM, 2.5% HIV infected). The prevalence estimates of any extragenital GC and CT were: 2.4% [95% CI: 1.9-2.9] GC and 3.7% [95% CI: 3.1-4.4] CT in women; 2.6% [95% CI: 2.2-3.1] GC and 1.6% [95% CI: 1.3-2.0] CT in MSW; 18.9% [95% CI: 16.0-22.0] GC and 11.8% [95% CI: 9.4-14.5] CT in MSM. Among women, 30.1% [95% CI: 23.3-37.7] of all cases of GC and 12.8% [95% CI: 9.8-16.2] of all cases of CT would have been missed if extragenital testing were not done. Age ≤ 18 years was the strongest predictor of extragenital infections in women.

Conclusions: Although the prevalence of extragenital gonorrhea and chlamydia is highest among MSM, nearly one third of gonorrhea cases in women would be missed with genital-only testing. Screening for rectal CT, pharyngeal CT and pharyngeal GC should be considered in young women attending STD clinics when extragenital exposures are reported.

Ruben Troncoso, MS1 Mentor: Ed Hsu, MD

Oral Presenter, Public Health and Community Service

Fatal Nightclub Fires

Background: Fatal nightclub fires are recurring events that have the potential to become mass casualty incidents. The combination of an enclosed space with minimal lighting, a young adult population and possible drug use make nightclub fires a unique event. Despite mass casualty nightclub fires being repeatedly reported by the general media, the availability of epidemiological data in the scientific literature is scarce. The purpose of this study is to provide surveillance data on fatal nightclub fires and identify factors associated with increased morbidity and mortality.

Methods: A LexisNexis search followed by sequential searches of popular Internet-based English-language media outlets and a supplemental PubMed and EMBASE database search. Date, country, geographic region, attendance, capacity, reported lapses in fire safety measures, morbidity and mortality were recorded. Bivariate analysis of mortality and morbidity were conducted using a nonparametric Wilcoxon rank test.

Results: A total of 65 fatal nightclub fires were reported between 1929-2013, resulting in 3790 fatalities. Among 40 events with morbidity information, a total of 4390 injuries were recorded. Seventy-two percent of reported fatal nightclub fires occurred after 1989 and 42% have occurred since 2000. Among 26 events with reported causes, 58% were caused by indoor pyrotechnics. In bivariate analysis, events occurring between 1970-1979 and 1990-1999 were associated with increased mortality and events occurring between 1990-1999 and in East Asia were associated with increased morbidity. Among 30 events with reported lapses in fire safety measures, lacking a sprinkler system, overcapacity and blocked egress routes were associated with increased mortality and among 26 events with available information regarding morbidity and lapses in fire safety measures, lacking a sprinkler system and overcapacity were associated with increased morbidity.

Conclusions: Fatal nightclub fires are increasing in incidence with indoor pyrotechnics being a primary cause. Future efforts should focus on identifying barriers of fire safety enforcement and improving surveillance data.

Harrison Tsai, MS2 Mentor: Srinivasan Yegnasubramanian, MD PhD

Oral Presenter, Basic Science

Genome-wide RNA sequencing analysis of androgen independent prostate cancer cell lines

Background: Patients with metastatic prostate cancer typically undergo androgen deprivation therapy as standard of care, but their tumors ultimately progress to a lethal androgen-independent stage. Androgen-sensitive prostate cancer cell lines, such as LNCaP, VCaP, and LAPC4, together with their androgen-independent sublines generated through prolonged passage in vitro or in vivo under androgen-depleted conditions, have been developed as simple models of progression encountered during androgen deprivation therapy. We conducted a genome-wide RNA sequencing analysis of cell line pairs to identify candidate genes underlying mechanisms of resistance to androgen deprivation therapy.

Methods: Our lab performed strand-specific sequencing of RNA from three androgen-sensitive prostate cancer cell lines (LNCaP, VCaP, LAPC4) and their androgen-independent derivatives (LNCaP-abl, VCaP-CR, LAPC4-CR). For each cell line pair, we quantified expression of annotated genes, identified potentially novel expressed regions through transcript assembly, and evaluated differential expression. We also conducted a crude differential splicing analysis based on reads containing alignment gaps indicative of spliced introns.

Results: An average of 21.6 million reads were sequenced per cell line. Out of 36,555 annotated genomic loci, 154 were differentially expressed between LNCaP and LNCaP-abl, 51 between VCaP and VCaP-CR, and 136 between LAPC4 and LAPC4-CR. Genes KLK3 and GDF15 were down-regulated across all three androgen-independent cell lines. Additionally, 19 previously unannotated, novel regions of transcription were differentially expressed between LNCaP and LNCaP-abl, 15 between VCaP and VCaP-CR, and 11 between LAPC4 and LAPC4-CR, including candidate antisense genes opposite RIMS1 and DSG1. Genes with greatest evidence of differential splicing were ZFAS1 in the LNCaP pair, and RPS24 in the VCaP and LAPC4 pairs.

Conclusions: Using next-generation RNA sequencing analysis, we found evidence of differential expression, splicing, and antisense transcription among prostate cancer cell lines modeling progression to androgen independence. To further single out candidates for possible experimental follow-up, studies are underway to incorporate methylation data into the analysis.

Ahad Waraich, MS2 Mentor: Janet Record, MD

Oral Presenter, Public Health and Community Service

A New Role for Pharmacy Technicians in Medication History Taking and Management

Background: Medication reconciliation is crucial for patient safety. A pharmacy technician (PT) would be a new means by which to obtain information on medication histories, information that may improve safety of inpatient medication ordering. The purpose of our study was to quantify discrepancies between different sources of medication history and to compare potential adverse drug events (PADEs) before and after a PT's information was available to providers.

Methods: A PT conducted a patient interview for medication history and obtained a medication list from the outpatient pharmacy for each patient. We quantified discrepancies between the provider's History and Physical, the pharmacy, and the PT's patient interview. Information from the PT was unavailable to providers for patients in the pre-intervention group, but was available to providers for patients in the post-intervention group; we looked at admission orders to compare the number and severity of PADEs between the two groups.

Results: Compared to pharmacy, H&P omitted 26.6% of medications, 13.4% of medications had dose discrepancies (DDs), and 5.7% of medications had frequency discrepancies (FDs). Compared to PT's patient interview, H&P omitted 13.6%, 10.6% had DDs, and 8.2% had FDs. Compared to pharmacy, PT's patient interview omitted 21.0%, 6.7% had DDs, and 8.9% had FDs. Once PT information was available to providers, the percentage of patients experiencing PADEs decreased (83% to 59%, p=0.04), there was a trend towards reduction in total number of PADEs (47 to 35, p=0.07), and overall severity of PADEs decreased (p=0.09; number of serious PADEs: 5 to 0).

Conclusions: Discrepancies among sources of medication history are common; no single source is sufficient. The PT adds important information, as both pharmacy data and patient interviews are different from H&P. Finally, the PT appears to improve the safety of medication ordering upon admission.

Zhikui Wei, MS2 Mentor: G. William Wong, PhD

Oral Presenter, Clinical Research

Targeted disruption of C1q/TNF-related protein 9 (CTRP9) increases food intake, decreases insulin sensitivity, and promotes hepatic steatosis in mice

Background: CTRP9 is a newly identified adipokine in the C1q/TNF-related protein (CTRP) family. CTRP9 protein was shown to be reduced in obese mice and form heterotrimeric complexes with adiponectin. Also, overexpression of CTRP9 conferred striking protection against diet-induced obesity and type 2 diabetes in mice. However, it remained to be determined whether CTRP9 was essential in the whole-body metabolism of mice.

Methods: Here, a loss-of-function approach was employed to establish the significance of CTRP9 in whole-body metabolism. Black 6 mice deficient in CTRP9 were generated, which were then compared to the WT controls regarding metabolic parameters, including body weight, body composition, food intake, meal size, and serum lipid profile. Tissues were harvested for molecular identification of the underlying mechanisms responsible for the metabolic alterations caused by CTRP9 deletion.

Results: Male CTRP9 KO mice were significantly heavier compared to the WT mice on a standard chow diet. The average weight of male CTRP9 KO mice was 43 ± 1.5 g, compared to WT controls with an average weight of 32.7 ± 1.23 g at 47 weeks. Meanwhile, CTRP9 KO mice had increased food intake, due in part to up-regulated expression of hypothalamic orexigenic neuropeptides. In particular, CTRP9 knockout mice increased food intake by increasing their meal sizes without changes in meal frequency. CTRP9 deletion also resulted in insulin resistance, leading to increased fasting insulin levels, impaired hepatic insulin signaling, and reduced insulin tolerance. Increased expression of lipogenic genes, likely from hepatic insulin resistance, combined with enhanced caloric intake contributed to the occurrence of hepatic steatosis in CTRP9 knockout mice.

Conclusions: Our results established the physiological significance of CTRP9 in controlling energy balance via central and peripheral mechanisms. Our study indicated that pharmacologically elevating circulating CTRP9 levels may have therapeutic value in treating obesity and obesity-associated metabolic disorders.

Elizabeth Wu, MS4 Mentor: Ashley Cimino-Mathews, MD

Oral Presenter, Clinical Research

Epithelial cell adhesion molecule (EpCAM) expression in invasive and in situ lobular carcinomas.

Background: Epithelial cell adhesion molecule (EpCAM) is a transmembrane protein important in cell adhesion and oncogenesis. EpCAM disrupts cell-cell interactions mediated by E-cadherin. Invasive lobular carcinoma (ILC) of the breast is characterized by dysfunction of E-cadherin, leading to its discohesiveness. Previous studies showed that high EpCAM expression in invasive ductal carcinomas is associated with progressive and metastatic disease. We investigate EpCAM expression in ILC and lobular carcinoma in situ (LCIS) with clinicopathologic characterization.

Methods: Tissue microarrays (TMAs) containing 36 cases of primary ILC were labeled by immunohistochemistry for EpCAM. ILC cases consisted of 34 luminal A (ER+/PR+/Her2-), 1 luminal B (ER+/PR+/Her2+) and 1 Her2+ (ER-/PR-/Her2+). 14 cases were stage I, 13 stage II, 8 stage III and 1 stage IV at diagnosis. 19 cases concomitantly sampled LCIS. Membranous EpCAM score was quantified as the product of staining intensity (weak = 1, moderate = 2, strong = 3) and distribution (1-100%), and subclassified as low (0-100), moderate (101-200) or high (201-300).

Results: 2 cases did not survive processing and were excluded. Of the remaining 34 cases, EpCAM labeling was seen in 21/34 and absent in 13/34. All 21 positive cases displayed weak to moderate staining, with 90% of positive cases exhibiting a low expression score and 10% exhibiting a moderate expression score. Of 19 cases with both ILC and LCIS, 9/19 showed higher EpCAM score in the LCIS vs. paired invasive component, 6/19 showed the reverse, and 4/19 had equivalent EpCAM scores. No correlation was seen between EpCAM score and carcinoma grade, stage, or Her2 status.

Conclusions: The finding of increased EpCAM expression within LCIS relative to paired ILC is counterintuitive, as previous studies have associated EpCAM with higher tumor cell invasiveness and aggressiveness. Further investigation is needed to elucidate the role of EpCAM in lobular carcinoma.

Tim Xu, MS2 Mentor: Bradford Winters, MD

Oral Presenter, Clinical Research

Evaluation of Noninvasive Hemoglobin Monitoring in Surgical Critical Care Patients

Background: The Rad-87 Rainbow® SET pulse co-oximeter (Masimo Corporation) allows continuous, noninvasive monitoring of hemoglobin concentrations (SpHb). The clinical accuracy of SpHb requires further validation. We hypothesized that SpHb would be clinically useful in the surgical ICU setting.

Methods: 547 patients from two adult surgical ICUs were enrolled in the study. Patients had the SpHb pulse co-oximeter placed on arrival to the ICU; Core and Stat lab Hb measurements were taken at the discretion of the clinicians, who were blinded to SpHb values. We compared all SpHb and lab values point to point and at thresholds commonly used to trigger transfusion.

Results: 383 patients had at least one time-paired SpHb and lab for a total of 2474 time points. There was a poor linear regression correlation between SpHb and labs [R2 = 0.29]. Bland-Altman analysis showed a bias of 1.0 g/dL and limits of agreement of 4.6 g/dL and -2.5 g/dL. The accuracy was best at lab values of 10.5-14.5 g/dL (bias = -0.8-0.9 g/dL) and least at lab values of 6.5-8 g/dL (bias = 1.8-3.3 g/dL).

When sequential lab values declined below 8 g/dL, the sensitivity and specificity of SpHb were 16% and 95% (N=103); at 7 g/dL, they were 7% and 99% (N=13). At a threshold of 8 g/dL, continuous SpHb values predicted the need for transfusion before the labs in 44 of 103 instances (43%); at 7 g/dL, it did so in 4 of 13 instances (31%).

Conclusions: SpHb shows a greater bias in ICU patients than has previously been reported, especially at lower Hb ranges. Continuous Hb monitoring has poor sensitivity at critical Hb thresholds and is unable to identify the need for transfusion before labs in most patients. The accuracy of SpHb needs to be improved to support clinical decision-making in surgical critical care patients.

Georgia Yalanis, MS2 Mentor: Justin M Sacks, MD

Oral Presenter, Clinical Research

Mastectomy Flap Weight and Tissue Expander Fill Volume Predict Skin Necrosis and Increased Costs Associated with Breast Reconstruction

Background: Impaired vascular perfusion in breast reconstruction with tissue expander placement can lead to mastectomy flap necrosis, infection, and re-operation. This study investigated factors associated with skin necrosis in breast reconstruction following mastectomy.

Methods: We retrospectively reviewed 169 women with immediate tissue expander (TE) placement following mastectomy between May 2009 and May 2013. Patient demographics, comorbidities, intraoperative and postoperative outcomes were collected. Logistic regression was performed on individual variables. For breast-dependent outcomes, standard errors were adjusted for within-patient correlation. Billing data was obtained for all 169 women to determine costs associated with mastectomy flap necrosis.

Results: This study included 251 immediate TE placements from 169 women. Skin necrosis occurred in 20 flaps for 15 patients (8.9%). Patients with hypertension (HTN) had 8 times the odds of developing skin necrosis (OR: 8.10, $p<0.001$). Patients with a TE intraoperative fill volume greater than 300cc had 10 times greater odds of skin necrosis (OR: 10.13, $p=0.012$). Intraoperative fill volume greater than 400cc resulted in a 14 times greater odds of skin necrosis (OR: 14.78, $p=0.003$). Mastectomy flaps weighing over 500g had a 10 times higher odds of skin necrosis and flaps weighing over 1000g had an 18 times higher odds of developing skin necrosis (OR: 9.91 and OR: 18.00, respectively; $p<0.001$). BMI was associated with mastectomy skin necrosis for patients with a BMI over 30 ($p=0.0034$). Patients with mastectomy flap necrosis requiring surgical debridement suffered an average additional inpatient cost 49% higher.

Conclusions: Mastectomy flap necrosis is associated with HTN, increased tissue expander fill volume, and mastectomy flap weight. Conservative fill volumes should be considered for patients with HTN, larger BMI's, and larger mastectomy flap specimens. Reoperation poses a significant financial and emotional burden. Clinical outcomes and patient quality of life can be improved using these parameters as guidelines in staged breast reconstruction.

Linda Yin, MS2 Mentor: Douglas Reh, MD

Oral Presenter, Clinical Research

A New Endoscopic Staging System for Hereditary Hemorrhagic Telangiectasia

Background: Hereditary hemorrhagic telangiectasia (HHT) is an inherited autosomal dominant disease characterized by the presence of nasal mucosal telangiectases causing severe, recurrent epistaxis necessitating medical and surgical treatment. Recently, a validated questionnaire, the Epistaxis Severity Score (ESS), was developed as a standardized measure of epistaxis severity that provides physicians with a means to evaluate treatment efficacy. Although prior endoscopic staging systems have been proposed to evaluate nasal findings in HHT patients, none have been correlated to the ESS.

Methods: Individuals with HHT confirmed by Curaçao criteria were recruited at the Johns Hopkins HHT Center for Excellence. Study subjects were evaluated by a single otolaryngologist with nasal endoscopy between August 2010 through February 2013. Endoscopic findings were noted including patterns of telangiectases, density and location of telangiectases, degree of nasal crusting, and presence of septal perforation. A HHT Endoscopy Score was calculated for each subject. Multiple linear regression models were used to correlate endoscopic findings to the ESS.

Results: A total of 33 subjects completed the study. Mean (SD) age was 50.3 (13.2), and 20 (60.6%) were female. In the cohort, mean (SD) ESS was 4.05 (2.13) and ranged from 0.50 to 8.22. Most subjects (53.1%) had more than 4 nasal sites involved and the majority (56.2%) had punctate telangiectases. One-half of the cohort had no crusting, while 30.3% had mild crusting and 21.2% had moderate/severe crusting. These endoscopic parameters were weighed by their correlation coefficients against the ESS and normalized to create the HHT Endoscopy Score. After adjusting for age, concomitant medical treatment, and previous minimally invasive treatment, the HES score was strongly associated with the ESS ($r=0.79$, $p<0.001$).

Conclusions: This newly developed objective endoscopic scoring system correlates highly with patient reported ESS. It may provide valuable information in evaluating response to treatment and act as a useful outcome measure in future clinical trials.

Andrea Yonge, MS2 Mentor: Stacy Suskauer, MD

Oral Presenter, Clinical Research

Assessment of motor speed in children with concussion

Background: Mild traumatic brain injury, or concussion, is common among children and adolescents, but motor deficits have not been well-studied in this population. The purpose of this study is to assess motor speed in children with concussion using the timed movements portion of the Physical and Neurological Examination of Subtle Signs (PANESS), and to determine if PANESS scores change with recovery from concussion.

Methods: We conducted a retrospective chart review of patients aged 6 to 18 years seen in the Neurorehabilitation Concussion Clinic at Kennedy Krieger Institute from April 2010 through June 2013. PANESS measurements included timed repetitive movements (foot tap, hand pat, and finger tap) and patterned movements (heel-toe, hand pronation/supination, and finger sequence); each was completed on the left and right sides, yielding 12 measurements. Z-scores were calculated using norms for age, sex, and handedness. Categorical scores were computed to characterize scores as normal, moderately impaired, or severely impaired. Wilcoxon signed-rank tests were used to evaluate motor speed changes over time in a subset of patients with two sets of PANESS data – one while symptomatic and one during clinical recovery.

Results: Data were examined for 102 younger patients aged 6 to 12 years and 220 older patients aged 13 to 18 years. While symptomatic from concussion, younger patients had low z-scores in 9/12 PANESS measures, and older patients had low z-scores in all 12 measures ($p < 0.05$). Both younger and older patients demonstrated improvement in scores with clinical recovery ($p = 0.003$ and $p < 0.0001$, respectively).

Conclusions: Motor speed deficits are present in children with concussion, and these deficits appear to improve with clinical recovery. Our findings suggest that the PANESS is a useful tool for assessing impairment and tracking recovery from concussion. Further research is needed to determine whether these measures can be used for diagnosis and prognostication.

Angela Zeng, MS2 Mentor: Christopher Wu, MD

Oral Presenter, Clinical Research

NSAIDs in the management of post-cesarean pain: a meta-analysis

Background: The number of cesarean sections has been increasing. Effective post-cesarean pain management is important because the mother must care for her newborn baby while recovering from major abdominal surgery. Current treatment plans routinely utilize opioids whose adverse side effects can make caring for an infant challenging. Adding non-steroidal anti-inflammatory drugs (NSAIDs) to regimens may result in effective analgesia while decreasing opioid consumption and opioid-induced side effects. This meta-analysis evaluates the analgesic effects of NSAID administration following cesarean sections.

Methods: Cochrane CENTRAL, EMBASE, Scopus, and PubMed were searched. Randomized control trials that compared NSAID versus placebo or NSAID versus NSAID plus opioid in treating post-cesarean section pain were included. Two authors independently assessed trial quality and extracted data regarding study design, VAS scores, additional analgesic consumption, and number of patients experiencing adverse side effects. A third reviewer was consulted for disagreements. Data was pooled using RevMan 5.2.

Results: Twenty-one trials satisfied the inclusion criteria (1260 participants). Preliminary results show that the NSAID group reported significantly lower average VAS scores (standardized mean score difference [SMSD]= -0.64, 95% confidence interval [CI]= -0.87 to -0.41, $p<0.001$). The NSAID group reported significantly lower VAS scores at 6, 12, and 24 hours (SMSD6= -0.53, 95% CI= -0.86 to -0.19, $p=0.002$; SMSD12= -1.09, 95% CI= -1.77 to -0.42, $p=0.002$; SMSD24= -0.62, 95% CI= -0.84 to -0.39, $p<0.001$). A significant decrease in total supplementary opioid analgesic consumed was seen in the NSAID group (SMSD= -10.37, 95% CI= -13.25 to -7.50, $p<0.001$). Of the four studies that reported side effects, there was no difference in the incidence of nausea or vomiting, but the control group experienced more sedation (SMSD= 0.42, 95% CI= 0.19 to 0.90, $p=0.03$).

Conclusions: NSAIDs can effectively treat post-cesarean pain with decreased cumulative supplementary opioid consumption. Healthcare providers should consider adding NSAIDs to the routine treatment of post-cesarean pain.

BASIC SCIENCE

POSTER ABSTRACTS

Listed Alphabetically

Seyed Alireza Rabi, MD/PhD or Student in Residence Mentor: Robert Siliciano, MD PhD

Poster Presenter, Basic Science

Multi-step inhibition explains HIV-1 protease inhibitor pharmacodynamics and resistance

Abstract: HIV-1 protease inhibitors (PIs) are among the most effective antiretroviral drugs due to highly cooperative dose-response curves that are not explained by current pharmacodynamic theory. Another unresolved problem affecting the clinical use of PIs is that patients who fail PI-containing regimens often have virus that lacks protease mutations, in apparent violation of fundamental evolutionary theory. Here we show that these unresolved issues are related and can be explained through analysis of the effects of PIs on distinct steps in the life cycle. PIs do not affect virion release from infected cells but block entry, reverse transcription (RT), and post-RT steps. The overall dose-response curves can be reconstructed by combining the curves for each step using the Bliss independence principle. Thus independent inhibition of multiple distinct steps in the life cycle generates the highly cooperative dose-response curves that make these drugs uniquely effective. Approximately half of the inhibitory potential of PIs is manifest at the entry step, likely reflecting interactions between the uncleaved Gag and the cytoplasmic tail (CT) of the Env protein. Sequence changes in the CT alone, which are ignored in current clinical tests for PI resistance, can confer PI resistance, providing an explanation for PI failure without resistance.

Daniel Ardeljan, MS2 Mentor: Trinity Bivalacqua, MD PhD

Poster Presenter, Basic Science

The role of miRNA-21 knockout in the development of fibrotic bladder in mice fed a high fat diet

Background: Complications of diabetes and obesity on the bladder include fibrosis of the wall and incontinence. Fibrosis results from chronic inflammation and recent evidence suggests microRNA-21 (miR-21) may be a potential pro-fibrotic factor.

Methods: Wild type (WT) and miR-21-/- mice were fed chow or 60% high-fat diet (HFD) with 30% sucrose water for 20 weeks ad libidum. Metabolic syndrome was assessed by 2g/kg glucose tolerance test and weekly body weight measurements. Cardiovascular complications were assessed by pulse wave velocity (PWV) using a Doppler ultrasound probe. Continence was assessed by a urine spot test. Bladder smooth muscle contractility was assessed ex vivo in a myograph on bladder strips stimulated with carbachol and electrical field stimulation (EFS). Bladder morphology was assessed for fibrosis by collagen stain (masson-trichrome). Changes in miR-21 were assessed by qPCR.

Results: HFD mice gained 15g (miR-21-/-) or 11 g (WT), whereas chow mice gained 2.5g (WT and miR-21-/-). PWV measurements showed no differences between miR-21-/- and WT mice regardless of diet. HFD mice had higher glucose spikes and delayed return to baseline. Urine spot tests were consistent among all mice, showing a concentrated area where mice urinated, suggestive of bladder continence. Carbachol and EFS induce hypercontractility in bladder strips of WT+HFD compared to WT. Results for the effects on miR-21-/- mice are forthcoming.

Conclusions: HFD induced a metabolic syndrome characterized by weight gain and impaired glucose tolerance in WT and miR-21-/- animals. There is no evidence of aortic disease or incontinence.. The metabolic state in HFD mice appears to be associated with a hypercontractile bladder in WT mice, but the effects of miR-21-/- are not yet known.

Zachary Cordner, MD/PhD or Student in Residence Mentor: Kellie Tamashiro, PhD

Poster Presenter, Basic Science

Maternal High Fat Diet Exposure Affects Behavior, Cognition, and Hippocampal Gene Expression of Adult Offspring in Wild-Type Rats

Background: It is well established that exposure to a high-fat diet (HFD) increases one's risk for obesity, diabetes, and the metabolic syndrome and that these same metabolic disorders increase the risk of psychiatric diseases such as Major Depression and dementia. Additionally, recent data suggest that a HFD impairs neurogenesis and neuronal survival independent of obesity and diabetes.

While it is also generally accepted that the intrauterine environment is critically important for fetal development, few studies have assessed the effects of maternal diet on the risk of psychiatric and neurodegenerative disorders in offspring.

In this study, we used a rat model to investigate the impact of maternal diet during pregnancy and lactation on the behavior and cognition as well as gene expression and epigenetic gene regulation in the hippocampus of offspring.

Methods: Pregnant Sprague-Dawley rats were given ad libitum access to standard chow (n=12) or HFD (n=12). On postnatal day (PND) 21, two males per litter were killed and brain tissue was used for gene expression and epigenetic analysis. All other pups were weaned onto chow. Starting on PND90, one male from each litter was used for behavioral testing. On PND150, one male per litter was killed and brain tissue was used for gene expression and epigenetic analysis.

Results: At PND21, we found decreased expression of three genes, Insr, Lepr, and Slc2a1, in the hippocampus of pups whose mothers had been fed a HFD. During adulthood, the offspring of high-fat fed mothers weighed more, had increased food intake and increased preference for high-fat food. Further, they were hypoactive, had impaired dopamine release, and impaired memory compared to offspring of mothers that were fed a standard diet.

Additional gene expression and epigenetic studies are ongoing.

Conclusions: In our rat model, maternal diet appears to have a profound effect on gene expression, behavior, and cognition of offspring.

Yarden Fraiman, MS3 Mentor: Patrick Brown, MD

Poster Presenter, Basic Science

High levels of FLT3 ligand (FL) reverse etoposide resistance in FLT3-mutant acute leukemia via substrate inhibition: implications for treatment

Background: FLT3 is expressed in most human acute leukemias. When activated by FL, FLT3 signaling results in cell proliferation. Activating FLT3 mutations are common in AML and confer a poor outcome. We sought to determine plasma levels of FL in pediatric patients after chemotherapy, and the functional effect of FL on both wt and mutant FLT3 leukemia cells.

Methods: FL levels were measured using ELISA on plasma samples (n=352) isolated from plasma of children (n=75) enrolled on 4 clinical trials. Functional studies were performed with wt and mutant FLT3 leukemia cells. Cells were plated for 72hr in etoposide along with concentrations of FL (62.5 to 4,000 pg/ml).

Cell cycle and apoptosis were analyzed by FACS.

The mechanism of FL effects was explored by incubating cells in serum-free conditions+/- FL. FLT3 protein levels were determined by Western blot.

Results: Pediatric patients undergoing chemotherapy for acute demonstrate a pattern of plasma FL rise with low levels at baseline (mean 41 pg/ml) and peak levels at day 11-14 following initiation of therapy (mean: 1,190 pg/mL).

Cells with FLT3 mutations selectively demonstrate resistance to etoposide-induced apoptosis and cell cycle arrest at low concentrations of FL with dose-dependent reduction of etoposide resistance in increasing concentrations of FL, suggesting optimal etoposide-induced killing of mutant leukemias at peak FL levels.

Ba/F3-ITD cells pre-incubated with peak concentrations of FL showed diminished baseline FLT3 phosphorylation, suggesting substrate inhibition kinetics, providing a mechanistic basis for the observed loss of etoposide resistance.

Conclusions: Plasma FL rises to peak levels 11-14 days after initiation of chemotherapy. Through substrate inhibition of mutant FLT3 enzymatic activity, peak FL levels may reduce etoposide resistance that characterizes FLT3-mutant leukemia cells. Thus, introduction of etoposide in a “time sequential” manner during periods of peak plasma FL levels may enhance killing of residual chemoresistant FLT3-mutant leukemia cells.

Robert Hughes, MS2 Mentors: Edward Schaeffer, MD PhD and Paula Hurley, PhD

Poster Presenter, Basic Science

Androgen Mediated SPARCL1 Loss in Prostate Cancer

Background: Prostate cancer is the second leading cause of cancer-related death among men in the US. Disease aggressiveness, however, is varied, with high-grade cancer accounting for the majority of deaths due to metastasis. Identification of men at risk for recurrence and elucidation of the molecular processes that drive their disease is paramount, as these men are most likely to benefit from multimodal therapy. Previously, Hurley et al demonstrated that SPARCL1 (Secreted Protein, Acidic and Rich in Cysteine Like-1) loss is independently associated with metastatic prostate cancer recurrence. Recent data support the tumor suppressor function of SPARCL1 in the prostate. Our goal was to determine the mechanism by which SPARCL1 expression is suppressed in prostate cancer and how it can be pharmacologically induced.

Methods: Prostate cancer is hormonally driven, with aggressive forms having increased androgen signaling. Therefore, we hypothesized that increased androgen levels repress SPARCL1 expression. To test this, SPARCL1 gene expression was measured via QT-PCR both in the presence and absence of androgen. Chromatin immunoprecipitation (ChIP) assays were used to quantify protein bound to the SPARCL1 promoter and detect chromosomal modifications of the gene. Finally, histone deacetylase (HDAC) inhibitors were used to rescue SPARCL1 expression.

Results: In the presence of androgen, SPARCL1 gene expression decreases 3-fold. Also, ChIP assays demonstrate that: androgen receptor (AR) binding to the SPARCL1 promoter increases 8-fold, the SPARCL1 gene is deacetylated 10-fold, and RNA Polymerase II binding is diminished 3-fold. SPARCL1 expression can be rescued in vitro by treatment with 1nM Vorinostat for 48 hours.

Conclusions: Androgen represses SPARCL1 expression in prostate cancer through direct AR binding at the SPARCL1 promoter, HDAC mediated deacetylation, and subsequent loss of transcriptional machinery binding. Targeting this pathway with HDAC inhibitors could attenuate the metastatic potential of localized cancers. Further research on animal models is needed to assess the efficacy of such therapies.

Saami Khalifian, MS3 Mentor: Giorgio Raimondi, PhD

Poster Presenter, Basic Science

Novel Tolerogenic Therapies in Transplant Immunology: Targeting Inflammatory Cytokines to Modulate Alloreactive T cell Susceptibility to Immune-Regulation

Background: Limited understanding of inflammatory mediators' role in activating/regulating Tcells precludes transplantation tolerance induction. Pro-inflammatory cytokines activate alloreactive Tcells via previously unappreciated mechanisms: i), direct costimulation that counteracts costimulation blockade (CoB), ii) reduction of Treg suppressive activity, thereby limiting effectiveness of tolerogenic-regimens. We identified these inflammatory mediators (InflaMed) and developed strategies to blunt their effect.

Methods: In vitro assessment of InflaMed on Tcell activation/proliferation and Treg activity determined via CFSE-suppression assay. CTLA4-Ig (CoB) and/or InflaMed (from dendritic cell culture-supernatant [MATsup]) added to CFSE assay to dissect effect on tolerogenic potential of CoB. Luminex quantified expression of 23 cytokines in MATsup. Cytokine immunomodulatory-activity tested in vivo using mouse inflammatory bowel disease model (IBD; outcome measure=weight loss). Rag-knockout (and subsequently MyD88-knockout) mice adoptively transferred with Tcells (+/-Tregs), followed by injections of anti-IL-6R mAb. Luminex quantified accumulation of InflaMed in tissues after hindlimb transplantation (HTx).

Results: Bioinformatics identified IL-6,-1α/β as modulators of Tcell/Treg activity. In vitro analysis confirmed these cytokines promote Tcell-proliferation, inhibit Treg-suppression, and neutralize anti-proliferative effect of CoB. In vivo analysis in IBD model confirmed blockade of IL-6R after adoptive transfer of Tcells/Treg resulted in significantly delayed weight loss (not observed without Treg injection), suggesting blockade of IL-6 signaling restored regulation over disease development. Tcell/Treg from MyD88-/- mice (IL-1α/β, IL-18 use MyD88 for intracellular signaling) only delayed weight loss when MyD88 absent from both injected populations (Tcells/Tregs), corroborating in vitro observations that IL-1α/β, IL-18 have counter-regulatory effect on Tregs/Tcells. IL-1α/β,-6,-18 all accumulated in various tissues after HTx — further evidence of role in rejection.

Conclusions: InflaMed promote activation of alloreactive Tcells and reduce Tcell susceptibility to suppression by CoB. We identified synergistic activities of IL-1α/β,-6,-18, which must be considered when designing novel therapeutics. HTx data provides evidence that these cytokines play important role in promoting rejection. Targeting these InflaMed should translate into improved outcomes post-transplantation.

Mohamed Khattab, MS2 Mentor: Theodore DeWeese, MD

Poster Presenter, Basic Science

Small molecule–siRNA conjugates for targeted knockdown of DNA-PK and radiosensitization of prostate cancer cell lines.

Background: Radiation therapy kills cancer cells by inducing DNA double-strand (dsDNA) breaks. While ionizing radiation preferentially targets rapidly proliferating cancer cells, normal noncancerous tissue tolerance remains the major limiting factor to dose escalation and its greater therapeutic potential. Previous studies demonstrate that DNA-activated Protein Kinase, catalytic peptide (DNA-PK) is critical to Nonhomologous End Joining repair, the pathway triggered in response to dsDNA breaks. Reduction in DNA-PK expression yields higher rates of tumor kill. Here we chemically synthesize conjugates of small molecules that specifically recognize Prostate Specific Membrane Antigen (PSMA), a receptor overexpressed in prostate cancer, and deliver siRNA that knocks down DNA-PK expression once internalized and processed by RNAi. We hypothesize that our novel agents will selectively recognize PSMA-expressing cells, become successfully internalized and processed, yielding therapeutic-range levels of DNA-PK knockdown.

Methods: A panel of small molecules and variably modified siRNAs and controls were conjugated via a direct hydrazine reaction or after initial hydrazinonicotinamide and N-succinimidyl-4-formylbenzamide modification of the small molecules and siRNAs, respectively. Structures were verified by mass spectrometry. Lipofectamine transfection into LNCaP and PC3-PIP cell lines was conducted to investigate cellular processing of the siRNA. Treatment without lipofectamine was used to determine if conjugates could independently bind PSMA, internalize and knockdown DNA-PK. Expression levels of mRNA were determined by RT-PCR.

Results: Successful conjugate structures were confirmed by mass spectrometry. Transfections of conjugates show up to a 98% knockdown of DNA-PK mRNA expression relative to control. Treatment with conjugates show variable knockdown of DNA-PK mRNA expression relative to control with some showing up to a 70% reduction.

Conclusions: Cancer cell specific radiosensitization can improve tumor control while decreasing radiation-induced side effects. We demonstrate that chemically synthesized small molecule-DNA-PK-siRNA conjugates can be constructed, delivered and can successfully target PSMA-expressing prostate cancer, knocking down proteins in a fashion that would lead to selective prostate radiosensitization.

Patrick Mullane, MS2 Mentor: Ashley Ross, MD PhD

Poster Presenter, Basic Science

An Expression Guided Screen for Small Molecules Targeting the Lethal Phenotype of Prostate Cancer

Background: Death from prostate cancer is almost uniformly preceded by distant metastasis. Currently, no therapeutics exist that can inhibit this lethal metastatic phenotype, and the cumbersome nature of metastasis assays limit current methods of drug discovery. Here, we use expression-based analysis to identify “druggable” targets that can be used to tailor selective small molecule screens for candidate inhibitors of prostate cancer progression.

Methods: Death from prostate cancer is almost uniformly preceded by distant metastasis. Currently, no therapeutics exist that can inhibit this lethal metastatic phenotype, and the cumbersome nature of metastasis assays limit current methods of drug discovery. Here, we use expression-based analysis to identify “druggable” targets that can be used to tailor selective small molecule screens for candidate inhibitors of prostate cancer progression.

Results: Multiple drugs inhibited cell viability in a dose-dependent manner in 4 prostate cancer cell lines, with greatest inhibition in the androgen-responsive cell lines. 7 drugs showed significant inhibition of cell migration, including Celecoxib (19% inhibition), Simvastatin (29%), Gefitinib (57%) and Sunitinib (35%). Sorafenib, Eplerenone, and Metformin showed inhibition of cell invasion in the prostate development assay. A dilution series for Metformin showed a dose-dependent inhibition of prostate epithelial invasion at concentrations far lower than those effecting cell viability.

Conclusions: Use of gene expression data and bioinformatics facilitated smaller scale screening of inhibitors enriched for putative effects on prostate cancer. Through these methods we have identified known anti-cancer agents as well as small molecules with previously unknown effects on prostate cancer as potential inhibitors of metastasis. Lastly, use of an ex-vivo assay identified a possible role for Metformin in the suppression of prostate cell invasion.

Matthew Naumann, MS2 Mentor: Timothy Witham, MD

Poster Presenter, Basic Science

Analysis of Posterolateral Lumbar Spinal Fusion Using Reconstructed CT Radiographs, Biomechanical Testing, and Manual Assessment in PTH(1-34) and RhBMP-2 Treated Rabbits

Background: Spinal fusion is among the most common procedures performed in spine surgery. In the United States alone, more than 400,000 spinal fusions are performed each year, with the national bill for this procedure reaching $33 billion. Spinal fusion is utilized to treat numerous pathologies including spinal degeneration, trauma, and neoplasia. Recombinant human bone morphogenic protein-2 (rhBMP-2) is known to be a potent bone growth factor used in spinal fusion surgery. However, due to high cost, efforts are being made to find cheaper alternatives. Using the New Zealand White (NZW) rabbit lumbar dorsolateral spinal fusion model, we have attempted to determine the efficacy of Teriparatide (Forteo; synthetic parathyroid hormone (PTH 1-34)) at enhancing fusion.

Methods: We have also sought to determine if PTH 1-34 has a synergistic effect on spinal fusion when used in conjunction with rhBMP-2. Rabbits were randomly assigned to one of four treatment groups (control - spinal fusion with iliac crest autograft, PTH 1-34- spinal fusion with iliac crest autograft and systemic PTH 1-34, rhBMP-2 only and rhBMP-2 with systemic 1-34 PTH) . At the 6-week time point, rabbits were euthanized and their lumbar spines were removed and subjected to three assessments of fusion success: biomechanical testing, blinded manual palpation, and blinded CT scan assessment of fusion.

Results: Fusion masses present in rabbits treated with PTH 1-34 to enhance autograft fusion had both greater volume and cross-sectional area than control rabbits. However, rabbits treated with PTH 1-34 with autograft did not have significantly greater bending stiffness in any of the four tested orientations. In all fusion assessments, PTH 1-34 did not synergistically augment fusions when co-administered with rhBMP-2 compared to rhBMP-2 alone.

Conclusions: Although PTH 1-34 does enhance spinal fusion over iliac crest autograft, it does not significantly enhance spinal fusion when used with rhBMP-2 in a rabbit posterolateral fusion model.

Suresh Nayar, MS2 Mentor: Duojia Pan, PhD

Poster Presenter, Basic Science

Autophagic Role of Yes-Associated Protein in Hepatocellular Carcinoma

Abstract: Hepatocellular carcinoma (HCC) is the third leading cause of cancer death worldwide and accounts for close to 700,000 deaths annually. Despite the global burden of this disease, mechanistic understanding remains limited. Yes-associated protein (YAP), a potent oncogene and target of the Hippo tumor-suppressor pathway, plays an important role in hepatocyte proliferation and when amplified leads to clonal expansion and tumorigenesis. Conversely, autophagy, a type of "self-eating," plays an anti-tumorigenic role in the liver. Studies in Drosophila suggest that Hippo dysregulation, leading to increased YAP, suppresses autophagy, a characteristic of aggressive liver cancer. Therefore, we hypothesize that by blocking YAP, Hippo facilitates functional autophagy in HCC. To test our hypothesis, we used YAP transgenic (TG) and knockout (KO) mice and induced autophagy via starvation. Livers were harvested and formalin fixed. Subsequently, protein levels for YAP and microtubule-associated light chain 3 (LC3-I/II), an autophagy marker, were measured using Western blotting. YAP was largely up-regulated in the TG mice, though no strong correlation exists between YAP and LC3-II expression. However, there is evidence suggesting a buildup of LC3-I with high YAP levels, indicating a block in the autophagy pathway. YAP-KO mice had similar YAP expression to controls, and given this, no relationship between YAP and LC3I/II can be ascertained in KO mice. Cell morphology and liver characteristics were assayed with H&E staining. Both gross liver size and staining show a marked increase in cell proliferation in YAP-TG mice at baseline and during starvation. In summary, this pilot study cannot conclusively refute or support our central hypothesis that Hippo facilitates functional autophagy until repeated with increased power and supplementary in-vitro studies, but the YAP/LC3-I relationship in TG mice suggests that a targeted reduction in the YAP oncogene may be a pharmacologically viable strategy to augment increased autophagy and survival in HCC patients.

John-William Sidhom, MS2 Mentor: Jennifer Elisseeff, PhD and Daniel Valaik, MD

Poster Presenter, Basic Science

Design & Development of Novel Filtration Device for the Removal of Immunogenic Wear Debris in Artificial Joints

Background: Total Joint Arthroplasty (TJA), a surgery that replaces the native joint with an artificial joint, has had tremendous success in providing patients suffering from osteoarthritis (OA) pain relief and mobility. However, because of the rigorous loading conditions of the knee, these artificial joints suffer from wear that leads to failure and revision surgery; a procedure where the artificial joint is replaced. As the artificial joint wears down and releases submicron particles, macrophage in the synovium phagocytose them, resulting in a downstream cascade of signaling that leads to osteoclast upregulation and bone resoprtion; leading to loosening of the implant and the need for revision surgery.

Methods: While conventional approaches to this problem have attempted to improve materials of the joint, we developed a novel approach to filter out the immunogenic wear debris from artificial joints. In this study, we developed a bench model to simulate the flow dynamics within the knee in order to test the efficacy of various filter geometries, porosities, and quantities. UHMWPE cannula filters were used as filters where quantity and porosity were varied. Following filtration for 24 hours, 10 mL of filtered and unfiltered bovine serum was digested with 40 mL of HCL at 55° C for 1 hr and vacuum filtered with 0.1 µ PC filters. SEM imaging & a custom-designed MATLAB image analysis algorithm were used to quantify changes in particle concentration before and after filtration.

Results: Preliminary results show 10% reduction in wear debris after filtration for 24 hours with one 90µ filter.

Conclusions: We believe this initial proof-of-concept provides a reason to believe that the use of a simple filtration technology alongside TJA can extend the life of these implants by capturing the immunogenic wear debris that lead to osteolysis and implant failure.

Mark Wilcox, MS2 Mentor: Antonello Bonci, MD

Poster Presenter, Basic Science

Insular cortex responses associated with electrical stimulation in basolateral amygdala

Abstract: Drug addiction is defined as a chronic, relapsing brain disease characterized by compulsive drug seeking and use despite harmful consequences. Although patient behaviors are well characterized, key circuits underlying these behavioral patterns are not well understood. The rewarding properties of drugs of abuse require the integration of information from the environment, such as taste and smell, as well as the subsequent transfer of this information to brain areas controlling drug seeking behavior. One such brain area is the insular cortex (IC), which integrates many sensory inputs and is associated with determining how valuable a given reward might be. In an effort to understand more about the role of the IC in drug seeking, this study utilizes anesthetized mice to measure electrical properties before and after administration of cocaine, the hypothesis being that cocaine will increase the strength of the signals traveling to the IC. To test this hypothesis, the basolateral amygdala (BLA) was stimulated using a pulse of electrical current delivered through an electrode. Consistent responses were recorded in the IC using a separate probe placed at precise depths in the IC under stereotactic control. Cocaine, injected into the peritoneal space in the animals abdomen, increased the amplitude of the response in the IC., which suggests that cocaine modulates synaptic inputs from the BLA to the IC. BLA inputs might have stronger influence on IC activity in the presence of cocaine.

CLINICAL RESEARCH POSTER ABSTRACTS

Listed Alphabetically

Rachel Blair, MS4 Mentor: Laila Tabatabai, MD

Poster Presenter, Clinical Research

Multiple Brown Tumors Mimicking Metastasis in Parathyroid Carcinoma (Note: This is a clinical vignette rather than original clinical research)

Background: Parathyroid carcinoma is a rare malignancy which warrants consideration when a patient presents with a palpable neck mass, high serum calcium levels and high parathyroid hormone levels, as well as complications of hypercalcemia. We describe a case of parathyroid carcinoma causing multiple brown tumors of hyperparathyroidism, also known as osteitis fibrosa cystica.

Methods: A 33 year-old male patient was initially evaluated for a 9-month history of bilateral knee pain. Outside hospital investigations were remarkable for hypercalcemia and multiple lytic lesions in the bilateral tibias and pelvis.

Results: Physical exam was significant for a 4 cm, mobile, firm left-sided paratracheal mass. He had tenderness to palpation in the left distal femur and proximal tibia. Ionized calcium was elevated to 1.76 mmol/L, serum calcium was 13 mg/dL, and intact parathyroid hormone was elevated to 787 pg/mL. A CT chest/abdomen/pelvis demonstrated a 2.7 x 2.2 x 3.4 cm mass abutting the inferior aspect of the left thyroid lobe, confirmed by ultrasound and PET/CT. FNA biopsy of the neck mass revealed that the tissue was of parathyroid origin but could not further classify the tissue as carcinoma or adenoma. FNA biopsy of the right iliac wing demonstrated osteitis fibrosa cystica with no evidence of metastatic disease.

The patient underwent radical left parathyroidectomy with en bloc left thyroid lobectomy and level 6 central lymph node dissection. Pathology was consistent with parathyroid carcinoma without lymph node metastasis.

Conclusions: This case illustrates that FNA biopsy cannot reliably differentiate between benign and malignant parathyroid disease. Therefore, FNA biopsy should be avoided to decrease risk of tumor seeding when parathyroid carcinoma is suspected. In contrast, this case highlights that FNA biopsy of lytic bone lesion may be necessary to distinguish between metastasis or osteitis fibrosa cystica in advanced disease, as both are FDG-avid and therefore difficult to distinguish on PET/CT imaging.

Allison Brandt, MS2 Mentor: Russell Margolis, MD

Poster Presenter, Clinical Research

ACC Glutamate and Cognitive Function in Patients with Schizophrenia

Background: Current treatments for schizophrenia have focused primarily on dopamine and related pathways in the brain and have not generally been effective in reducing core cognitive symptoms. Glutamate in various frontal brain regions, including the Anterior Cingulate Cortex (ACC), has been implicated in cognitive function in schizophrenia. While Glutamate is not readily resolvable from glutamine and GABA using magnetic resonance spectroscopy (MRS) at 1.5 or 3 Tesla, it has been found to be resolvable at 7 Tesla. Few studies have used 7T MRS to explore glutamate levels in patients with schizophrenia.

Methods: We are studying the association between glutamate levels in the ACC and cognitive function in 15 patients and controls. Cognitive function is measured by the Montreal Cognitive Assessment (MOCA). Glutamate levels in the ACC are measured by MRS at 7T. Patients were recruited from Hopkins clinics and the community. Controls were recruited from the Hopkins community and matched in age and education level. To date, 15 patients and 11 controls have completed the study. Glutamate levels will be quantified using LCModel software and new data will be combined with data collected in 2011 from 12 patients and controls. T-test and logistic regression analyses will be used to examine the association between glutamate levels in the ACC, MOCA scores, and patient status.

Results: We have successfully recruited 26 of 30 participants and efforts are actively continuing. Preliminary spectrum analysis indicates that the 7T MRS protocol was successful in quantifying glutamate levels in the ACC. We are awaiting completion of recruitment to pursue final data analysis.

Conclusions: We report here rapid and successful attainment of recruitment goals and implementation of a protocol and analysis methodology that is meeting the objective of quantifying ACC glutamate levels and assessing their relation to MOCA scores in a preliminary study.

Jason Cohen, MS3 Mentor: Edward Schaeffer, MD PhD

Poster Presenter, Clinical Research

Multidisciplinary clinic evaluation changes prostate cancer stage and risk stratification

Background: The use of multidisciplinary clinics (MDCs) for outpatient cancer evaluation is increasing. Data on whether MDCs improve prostate cancer (PCa) care are limited. We studied the frequency of changes in PCa grade and stage upon MDC evaluation.

Methods: Between May 2008 and December 2012, 887 consecutive patients underwent consultation for newly diagnosed prostate cancer at the Johns Hopkins Hospital (JHH) MDC, which features real-time collaboration among urologists, radiation oncologists, and medical oncologists. Retrospective chart review identified presenting tumor characteristics, based on outside assessment (medical records sent upon referral to MDC), as compared with disease stage and grade as determined at MDC evaluation. All outside biopsy slides were reviewed by JHH pathologists, and all outside imaging (CT, MRI, bone scan) was reviewed by JHH radiologists.

Results: The three most chosen treatments after MDC evaluation were external beam radiotherapy +/- androgen deprivation (39.3%), radical prostatectomy (32.0%) and active surveillance/expectant management (12.9%). Using the NCCN guidelines as a benchmark, many men were found to have undergone non-indicated imaging (bone scan 23.9%, CT/MRI 47.4%). Overall, 186/647 (28.7%) had a change in their NCCN risk classification or N or M stage. For example, 2.9% of men were down-classified as very-low-risk, rendering them eligible for active surveillance. 5.7% of men thought to have localized cancer were up-classified as metastatic, thus prompting systemic management approaches.

Conclusions: Comprehensive evaluation of prostate cancer patients in a MDC is associated with critical changes in presenting disease classification from baseline in over one in four men. While questions about the long term costs and benefits of MDCs remain, these results lend credence to the growing belief that MDCs may dramatically impact management for a large number of men with prostate cancer.

Nicholas Culbertson, MS2 Mentor: Fizan Abdullah, MD PhD

Poster Presenter, Clinical Research

A Decade of Venoarterial ECMO Experience in Children and Neonates: Bucking the National Trend

Background: Recent data from the Extracorporeal Life Support Registry have reported trend towards use of venovenous (VV) extracorporeal membrane oxygenation (ECMO) over venoarterial (VA) modes and have attributed a decreased mortality rate to VV ECMO. However, there may be factors confounding that association, including increased mortality for children requiring high inotropic support prior to cannulation. Furthermore, wide variability in initiation protocols limits the utility of pooled multicenter data. Here, we report a decade of experience in an institution that has employed almost exclusively VA cannulation.

Methods: Patient records from all ECMO activations 2002-2012 at an academic medical center were retrospectively reviewed. A total of 152 neonatal and 104 pediatric patients were placed on ECMO for both cardiac and noncardiac diagnoses. Periprocedural and hospital admission outcomes were recorded.

Results: Results: Over the 10-year period, VA cannulation comprised 235 of 254 ECMO activations (93%). Overall survival was 61%; 104 neonatal and 71 pediatric placed on VA ECMO for primary cardiac diagnoses experienced a survival of 73 and 71% respectively. In contrast, the 36 neonatal and 25 pediatric patients placed on VA ECMO for noncardiac diagnoses experienced survival rates of 67 and 44% respectively. On univariate analysis, an increase in mortality was associated with a delay in the initiation of ECMO and precannulation acidosis. Oxygenation index, need for hemodialysis, and time on ECMO did not effect mortality.

Conclusions: Conclusions: At a center with a preference for predominantly VA ECMO, overall survival was comparable to national averages. Patients with noncardiac disease were at higher risk of death than those with cardiac disease. Given the complicated presentations of patients who require ECMO support, standardized protocols for initiation of VA versus VV should be developed.

Nicholas Culbertson, MS2 Mentor: Fizan Abdullah, MD PhD

Poster Presenter, Clinical Research

Thymectomy for Myasthenia Gravis in Children: A Comparison of Open and Thoracoscopic Approaches

Background: Thymectomy is an accepted component of treatment for juvenile myasthenia gravis (MG), but optimal timing and surgical approach have not been determined. Though small series have reported the feasibility of thoracoscopic resection, some studies have suggested that minimally invasive methods are suboptimal due to incomplete clearance of thymic tissue. Herein, we report the largest series of thymectomies for pediatric myasthenia gravis in the literature to date.

Methods: We reviewed a prospectively recorded database of patients undergoing thymectomy for MG between 1993 -2013 in a tertiary referral hospital. Twelve patients who underwent thoracoscopic thymectomy were compared to 16 patients who underwent open thymectomy via median sternotomy. Outcomes were determined in consultation with the treating pediatric neurologist and graded according to the Myasthenia Gravis Foundation of America (MGFA) clinical classification and quantitative MG scores for disease severity.

Results: In comparison to open surgeries, thoracoscopic resections were performed on patients earlier in disease progression and resulted in shorter inpatient time (1.8 vs. 8.0 days, $p=0.045$) and fewer perioperative complications ($p=0.039$). Both groups experienced a decrease in disease severity, pooled mean quantitative MG score fell from 9.8 to 2.0 after surgery ($p<0.0001$). At 18 months post thymectomy, quantitative MG scores were similar between the thoracoscopic and open groups (1.3 and 2.4, respectively, $p=0.2435$).

Conclusions: This analysis suggests that thoracoscopic thymectomy can be safely considered earlier in the sequence of potential treatments and does not appear inferior to median sternotomy in terms of disease control. Low perioperative morbidity and shortened hospital course make thoracoscopic thymectomy an attractive option in centers with sufficient medical and surgical experience.

Arun Das, MS2 Mentor: Jason Katz, MD

Poster Presenter, Clinical Research

The Delivery of Cardiovascular Care is Expensive, but Unique From Other Intensive Care Settings

Background: There has been a nearly 200% rise in general intensive care unit (ICU) costs in recent years. While the burden of critical illness has been increasing in the cardiac ICU (CICU), little is known about costs of care in these specialized units.

Methods: Records for all admissions to an academic CICU from July 2012 to March 2013 were reviewed. Routinely collected financial and demographic data were examined. The impact of comorbidity and case-mix on cost were evaluated, and non-cardiac ICU cohorts were used for cost comparisons.

Results: 676 patient visits were reviewed, accounting for 5,215 patient-days. Most patients were male (64%), >60 yo (77%), and white (59%). The cumulative cost-per-patient was $39,330 and cost-per-patient day was $5,097, resulting in total ICU costs of $12.3mn and hospital costs of $26.6mn. Fixed overhead and variable labor contributed the greatest to these costs. Compared to other critical care populations, labor accounted for less and medications/supplies accounted for more of the overall CICU financial burden. Blacks had a lower cost per patient day ($4,584) compared to whites ($4,921) despite being admitted with greater disease severity (3.25 vs. 3.06). Forty-two visits (6.2%) were readmissions. Costs for readmissions to the CICU within 30 days were higher than new admissions or readmissions to the CICU after 30 days.

Conclusions: Delivery of care in a contemporary CICU is costly, though driven more by medications, supplies and procedures, and less by labor than in other ICU settings. In particular, the costs of care associated with a CICU readmission were high. Future study will explore the financial impact of both unit structure and staffing.

Jacob Dey, MD/PhD or Student in Residence Mentor: Lisa Ishii, MD

Poster Presenter, Clinical Research

Seeing is Believing: A Novel Objective Evaluation of Facial Reanimation Surgery

Abstract: Objective: Use eye-tracking technology to objectively measure the ability of facial reanimation surgery to normalize the appearance of facial paralysis.

Methods: An eye-tracker system was used to record the eye-movement patterns, called scanpaths, of 86 naïve observers gazing at pictures of faces with unilateral paralysis (HB IV-VI), smiling and in repose, before and after facial reanimation surgery, as well as normal, non-paralyzed faces. Observers gazed at each face for 10 seconds, simulating a brief face-to-face interaction. Fixation durations for all predefined facial areas of interest were analyzed using mixed effects linear regression.

Results: Observers spent the majority of time [6.6 of 10 seconds] gazing in the central triangle region (eyes, nose, and mouth) of normal faces and paralyzed faces. Interestingly, facial paralysis causes marked and statistically significant deviations in attentional fixation within the central triangle. For instance, attention is diverted from the eyes and nose to the mouth, resulting in statistically significantly greater gaze times on the mouth in paralyzed faces as compared to normal faces, both smiling and in repose. Reanimation surgery does not significantly change this gaze deviation. Facial reanimation surgery is able to normalize the gaze asymmetries caused by unilateral facial paralysis, restoring a normal pattern of gaze between the functional and paralyzed sides of the face and mouth.

Conclusion: There were objective differences in the way observers directed their attention to facial features when viewing normal faces and paralyzed faces. After facial reanimation surgery, the attentional distraction caused by facial feature irregularities was reduced. These findings are important additions to the emerging body of objective evidence of the effectiveness of reanimation surgery; they also define reconstruction limitations and deficiencies that need to be improved.

Ali Ghasemzadeh, MS2 Mentor: Amir H. Dorafshar, MBChB

Poster Presenter, Clinical Research

Management of Pediatric Mandibular Condyle and Subcondyle Fractures: The Algorithmic Impact of Concomitant Mandibular Arch Fractures

Background: Pediatric mandible fractures are rare, and correct management is crucial to preserving normal facial growth and jaw function. We examine the differences in treatment between isolated condylar and subcondylar fractures (CSC) and CSC fractures with at least one concomitant fracture of the mandibular arch (CMA).

Methods: Retrospective chart review was performed for all patients between the ages of 0 and 18 presenting with mandibular fracture from 1990-2010. Imaging was reviewed for all patients to confirm fracture pattern, characteristics, and displacement. For arch fractures, maximum cortical step-off was determined in millimeters. Statistical analysis was performed using two-tailed student's t-tests, chi square tests. Loess curve analysis was used to determine fracture displacement cutoffs.

Results: Fifty-five patients with 77 CSC fractures were identified. There were 25 (45.5%) patients with isolated CSC fractures and 30 (54.5%) patients with CMA. Fifteen patients (60%) with CSC fractures were treated conservatively (range of motion exercises and soft diet), compared to only 4 patients (13%) with CMA ($p<0.001$). Seventeen of 30 patients (57%) with CMA received open reduction and internal fixation (ORIF) of their mandibular arch fracture(s) while no patients with CSC fractures were treated with ORIF, regardless of level of fracture displacement. Eleven of 14 patients (78.5%) with CMA and maximum cortical displacement greater than 3mm were treated with ORIF compared to 6 of 16 patients (37.5%) with less than 3mm displacement ($p<0.001$). Differences in complication rates between patients receiving conservative treatment (n=2, 5.7%), maxillomandibular fixation (MMF, n=1, 2.9%), or arch fracture ORIF (n=5, 14.3%) were not statistically significant ($p=0.19$).

Conclusions: Pediatric CSC can be successfully managed with conservative therapy or a short course of MMF regardless of degree of fracture displacement or the presence of additional mandible fractures. CMA fractures may require ORIF. In this setting, our data suggests that 3mm of maximum cortical arch displacement is an indication for ORIF.

Katherine Giuliano, MS2 Mentor: Nita Ahuja, MD

Poster Presenter, Clinical Research

Survival Following Lung Metastasectomy in Soft Tissue Sarcomas

Background: Even after successful treatment of the primary tumor, soft tissue sarcomas (STS) often metastasize to the lung, and the treatment of choice is metastasectomy. Patient characteristics and surgical factors that predict better survival outcomes are still debated.

Methods: We retrospectively analyzed 53 patients who underwent lung metastasectomy for STS from 1989 to 2013 and assessed the effect of demographics, primary tumor characteristics and management, disease-free intervals (DFI), and lung resection surgical details on overall survival (calculated from date of diagnosis to death or last visit). Statistical analysis was performed using SAS version 9.3 and consisted of Kaplan Meier survival estimates and Log-Rank Test to determine significance of categorical variables.

Results: Median overall survival was 63.7 months. Overall survival was 98.1% at 1 year, 68.0% at 3 years, 56.8% at 5 years, and 32.3% at 10 years. Post-lung metastasectomy survival was 82.9%, 52.2%, 28.3%, and 13.3% at 1, 3, 5, and 10 years, respectively. Lung metastases recurred in 64% of patients following lung metastasectomy. Age at diagnosis of less than 50 years is a significant predictor of improved overall survival (P=0.037). Low pathologic grade at diagnosis (P=0.040) and a DFI until metastasis diagnosis of greater than 13.5 months (P=0.007) are also positive prognostic factors. Patients who underwent VATS (Video-Assisted Thoracoscopic Surgery) had poorer outcomes than those who underwent open procedures (P=0.002). Chemotherapy, surgical margin status, number of total lung resections, and laterality, size, and number of metastases excised during surgery did not significantly affect survival.

Conclusions: Pulmonary metastasectomy remains as the treatment of choice for STS lung metastases. Patients who are diagnosed at a younger age with low-grade tumors and who have a longer DFI prior to the diagnosis of metastases gain the greatest survival advantage with surgery.

Andrew Halls, MS2 Mentor: Marco Grados, MD MPH

Poster Presenter, Clinical Research

Factor Analysis of the Leyton Obsessional Inventory-Child Version Identifies Pediatric Obsessive-Compulsive Spectrum Symptomatology

Background: The Leyton Obsessional Inventory - Child Version (LOI-CV) is an instrument for screening symptoms of obsessive-compulsive disorder (OCD) and the obsessive-compulsive spectrum in children and adolescents. It is a 20-item self-report questionnaire that provides a semi-quantitative measure (by 0-3 severity scale) of OCD. Epidemiological studies have regularly employed the LOI-CV to assess the prevalence of OCD, obsessive-compulsive symptoms and even early obsessive-compulsive personality traits in the pediatric population. Although personality disorders have been traditionally diagnosed in adulthood, recent data suggest there may exist childhood traits and behaviors that represent personality disorder precursors.

Methods: A principal components factor analysis with varimax rotation was performed on the responses of 94 children and adolescents from the United States and Greece to the LOI-CV.

Results: Four factors underlying the LOI-CV were identified: (I) Counting/Superstitions, (II) Contamination/Cleanliness, (III) Indecision/Perfectionism, (IV) Over-responsibility/Checking. Factor III included interference items aligning with diagnostic criteria for Obsessive-Compulsive Personality Disorder (OCPD) in adults. Three items showed poor association with any factors (spend extra time checking work, worry if things not done the way liked, do things over and over a certain number of times), and one item presumed to assess Factor III symptoms loaded instead onto Factor II (angry if others “mess up” desk or workspace).

Conclusions: LOI-CV factors align themselves with established diagnostic criteria and symptoms of OCD spectrum disorders, demonstrating the utility of the tool for the quantitative measurement of OCD. The instrument may contribute to the effective identification of pediatric OCPD precursors. Items interrogating for indecisiveness were found to load onto Factor III, the presumed “Child OCPD” factor, even though indecisiveness was removed from the criteria for OCPD in DSM-IV from DSM-III-R. Ambiguous wording of items may render different interpretations by pediatric patients than those by clinicians, suggesting that a revision to the LOI-CV may be warranted.

Andrew Halls, MS2 Mentor: Jennifer Payne, MD

Poster Presenter, Clinical Research

Correlations between NEO personality inventory scores and clinician-reported premenstrual and postpartum mood symptoms

Background: Investigations of the genetic basis of premenstrual mood symptoms show conflicting results. Personality is known to be substantially inherited, and data suggests that premenstrual mood symptoms display familiality via the neuroticism personality trait. Previous studies of premenstrual and postpartum mood have used self-reported data, but any personality correlations may result from differences in self-reporting rather than clinician-confirmed mood states.

Methods: In a cross-sectional study, 122 women with Major Depressive Disorder (MDD) or Bipolar Disorder (BP) were administered the Revised NEO Personality Inventory, a medical history, and standardized psychiatric interview. Premenstrual Mood Syndrome (PMS) was defined as significant mood symptoms occurring premenstrually without functional impairment. Premenstrual Dysphoric Disorder (PMDD) was defined as PMS causing significant functional impairment. Postpartum Blues (PPB) was defined as mood symptoms occurring shortly after delivery that did not meet criteria for a major depressive episode (MDE). Postpartum Depression (PPD) was defined as a MDE beginning within 4 weeks of delivery. Mean NEO personality scores of women with and without each diagnosis were compared using Student's t-tests and logistic regression.

Results: Mean extraversion was higher in women with PMS (104+/-17 vs. 96+/-30; $p<0.037$), and PMDD (109+/-15 vs. 100+/-22; $p<0.017$). Mean conscientiousness was higher in women with PPB (113+/-26 vs. 102+/-22; $p<0.026$), but PPD showed no personality associations. Women with PMS were more likely to have also experienced PPB (OR=3.17; $p<0.039$). Personality relationships became nonsignificant when considered simultaneously with demographic predictors in multivariate models.

Conclusions: Neuroticism showed no relationship with PMS in women with MDD or BP, suggesting that previous findings may be confounded by known associations between neuroticism and MDD/BP; and PMS and MDD/BP. Extraversion may be correlated with PMS and conscientiousness with PPB, though multivariate analyses were nonsignificant. Small sample size limits ability to observe significance. Future investigation will explore recall bias and personality differences between self-reported and clinician-reported data.

Kelly Harris, MS2 Mentor: Mohamad Allaf, MD

Poster Presenter, Clinical Research

Characteristics and Outcomes of Renal Cell Carcinoma in the Pediatric and Young Adult Population

Background: Less than 5% of renal cell carcinoma (RCC) cases occur in patients under age 40. Previous studies have evaluated characteristics and outcomes of RCC in the young adult population, but have relatively low power with conflicting results, demonstrating the need for further descriptive studies. In this study, we review our experience with patients under the age of 40 who have been diagnosed with RCC. The patient characteristics, pathologic features, and recurrence outcomes are described.

Methods: Our institutional renal mass database was queried for patients who underwent surgical intervention between 2003 and 2013 for renal cell carcinoma at age 40 or younger. A total of 119 patients were identified. Data extracted and analyzed included demographic information, details of initial presentation, pathologic characteristics, and recurrence outcomes.

Results: Of the 3117 patients in our institutional renal mass database, 157 (5.0%) patients were age 40 or younger at the time of surgical intervention. Renal cell carcinoma was found in 119 (75.8%) of these patients. The median age of this cohort is 37.1, and the age range is 10.2 to 40.9 years. 42.0% of patients presented with symptoms related to their renal mass. 50% of all tumors in this cohort were non-clear cell RCC, many of which were favorable histologic subtypes. Xp11.2 translocations were present in five (4.1%) patients. The majority of patients had stage pT1a and pT1b tumors (74.1%) and 86.2% of tumors were limited to the kidney. The vast majority (79.2%) of patients never had recurrence and have remained cancer-free since last follow-up.

Conclusions: We report that patients under 40 years of age are not more likely to present with symptoms and that non-clear cell carcinoma accounts for half of all RCC subtypes. Tumors are generally lower grade with little to no invasion or metastasis, recurrence is low, and prognosis is generally good for these patients.

Ronald Hoard, MS2 Mentor: Allan Belzberg, MD

Poster Presenter, Clinical Research

Monitoring Nerve Regeneration In-Vivo in a Rat Using Diffusion Tensor Imaging

Abstract: Background: Advancements in surgical reconstruction of peripheral nerves have created the need for a non-invasive technique to monitor neural regeneration. Diffusion Tensor Imaging (DTI) and T2 MRI sequencing (MRI Neurography) of nerve may serve this need. Prior to embarking on a study of imaging in nerve grafting, a pilot study was needed for proof of principal.

Methods: The Principal Investigator (Hoard) established a collaboration of neurosurgery (Belzberg, Tyler), radiology (Carrino, Zhang) and neurology (Hoke). ACUC permission was obtained. A rat sciatic nerve was crushed proximal to its branch point for two consecutive two-second intervals. The contralateral nerve served as control. DTI and T2-weighted MRI images were obtained three days post-operatively and at two weeks. 3D reconstruction of the DTI images with fractional anisotropy (FA) levels was developed.

Results: Fourteen day post-operative T2 images reveal increased sciatic nerve signal intensity proximal and distal to the injury site. DTI evaluation mirrored the T2 changes. Proximal to the injury site, the fractional anisotropy level was slightly decreased. At the injury site, there was further decrease in FA level with a steep loss in FA level moving distal to the injury site.

Discussion: Two weeks post-injury, the slight decrease in FA level proximal to, and at the injury site, reflect the response to axonotmesis. The rapid loss of FA level distal to the injury site likely reflects the regenerating growth cone and drop off of axons. The results served as preliminary data for a project investigating imaging of regenerating nerve in autograft and allograft nerve grafting. An industry supported grant has recently been obtained.

Conclusion: DTI and T2 MRI images allow identification of neural anatomical changes consistent with neuronal regeneration. Combining two-dimensional and three-dimensional imaging DTI with fractional anisotropy values may allow for improved assessment of peripheral nerve regeneration following nerve injury.

Rupert Hung, MS2 Mentor: Michael Blaha, MD

Poster Presenter, Clinical Research

The Prognostic Value of Exercise Capacity in Patients with Non-Revascularized and Revascularized Coronary Artery Disease: The FIT Project

Background: Low exercise capacity is strongly predictive of mortality in diverse patient populations, but remains understudied in patients with coronary artery disease (CAD). Given continued discussion on the optimal management of CAD, the degree that exercise capacity and revascularization status can predict outcomes remains an important area of study.

Methods: This mixed prospective/retrospective cohort study included 9,852 adults with known CAD (61±12 years old, 69% men, 31% African American) who underwent physician-referred treadmill stress testing at the Henry Ford Hospital in Detroit, Michigan from 1991-2009. Patients were stratified by both baseline revascularization status (non-revascularized, PCI, CABG) and metabolic equivalents (METS) achieved during stress testing (<6, 6-10, 10-12, >12 METS). Using Cox regression models, we calculated hazard ratios (HR) after adjusting for cardiac risk factors, baseline comorbidities, pertinent medications, and indication for testing.

Results: We observed 3,824 all-cause deaths, 1,880 MI, and 1,930 subsequent revascularizations over 11.6±5 years of mean follow-up. The non-revascularized, PCI, and CABG groups achieved 6.8±3, 7.6±3, and 6.6±3 METS, respectively ($p \leq 0.001$). Each 1-MET increment in exercise capacity was associated with HRs of 0.87 [95%CI 0.85-0.89], 0.87 [0.85-0.90], and 0.86 [0.84-0.89] for mortality; 0.98 [0.96-1.01], 0.88 [0.84-0.92], and 0.93 [0.90-0.97] for MI; and 0.94 [0.92-0.96], 0.91 [0.88-0.95], and 0.96 [0.92-0.99] for subsequent revascularizations in the non-revascularized, PCI, and CABG groups, respectively. Within each stratum of exercise capacity, prior PCI and CABG were associated with equivalent risk for mortality ($p>0.05$) and lower risk for MI and subsequent revascularizations ($p<0.05$).

Conclusions: Higher exercise capacity was associated with lower risk for mortality and subsequent revascularizations in all patients with CAD, and lower risk for MI in those with prior revascularizations. Patients with similar exercise capacities had equivalent risk for mortality, regardless of baseline revascularization status. These results support greater promotion of physical fitness to patients with CAD.

Minh-Huy Huynh, MS2 Mentor: Kristine E. Johnson, MD, MSc

Poster Presenter, Clinical Research

Social Isolation in Baltimore Drug Injection Users and its Implications

Abstract: The positive effect of social support on the ability to manage stressful life events and recover from substance use-related problems has been well established among injection drug users (IDUs) in the existing literature. However, few studies have examined the relationship between social support and factors like high-risk injection behaviors, homelessness, and healthcare access and utilization. The purpose of this study was to explore the association between the individual characteristics and behaviors of active IDUs and their perceived social support in Baltimore, Maryland.

We performed a cross-sectional observational study among 147 clients of a syringe exchange program. Participants were administered a survey including socio-demographic factors, substance use, injection practices, skin care, and medical history. Social support was measured using the validated Multidimensional Scale of Perceived Social Support (MSPSS), which examined the primary outcome of perceived support through three distinct domains: Significant Other, Family, and Friends. Variables with an acceptable amount of missingness (<10%) were analyzed in a multivariable model using the LASSO penalized regression method. The appropriate penalization bound was chosen using 10-fold cross validation.

Out of 115 variables examined, cleaning the injection site with alcohol before injecting had the strongest positive predictive ability for both increased family support and total social support. In terms of, injecting with family members or partner was the most predictive of increased significant other support. Moreover, report of having a primary care provider proved to be the best predictor for increased support from friends. Across significant other, family, and total social support, being homeless is the strongest estimate for decreased support. By establishing that homelessness and pre-injection skin care practices are strong predictors of levels of social support, efforts to distinguish and categorize IDUs by these factors may provide additional insights to guide public health interventions and current models of management.

Ben Janson, MS2 Mentor: Shameema Sikder, MD

Poster Presenter, Clinical Research

The Role of Physician Experience in Pterygium Surgical Outcomes.

Background: Pterygium is a fibrovascular ocular growth that causes astigmatism, discomfort, and poor cosmesis. The standard treatment is surgical excision, but problematically pterygia often recur. Factors associated with recurrence include procedure type, adjuvant use, demographics, and pterygium morphology. However, minimal study has examined the surgeon's experience. This study's purpose was to evaluate the role of surgeon experience in pterygium recurrence and complication rates after surgical removal.

Methods: This was a 9-year retrospective review of 139 primary pterygium eyes that received pterygium excision at Wilmer Eye Institute (Baltimore, MD). Demographic data were recorded and the procedure data included the procedure type, adjuvants used, attachment methods, and surgeon experience (attending or resident/fellow). Each type of procedure (bare sclera, conjunctival autograft, limbal-conjunctival autograft, amniotic membrane grafting, and primary closure) was analyzed separately. Postoperative data included all reported complications and recurrence time.

Results: 139 primary pterygium eyes were recorded. Average follow-up was 467±637 days (range: 15-2917 days). Between the two groups there were no statistical differences in patient demographics (all $p>0.59$). The recurrence rates by procedure were amniotic membrane grafts (24.4%), bare sclera (20%), conjunctival autograft (8.8%), conjunctival-limbal autograft (54.5%), and primary closure (30%). The recurrence rate was statistically different by procedure type ($p=0.003$). When comparing the two groups, recurrence rates and complication rates in procedure specific analysis were not statistically significant (all $p>0.074$). There were no statistically significant differences in recurrence time between the groups ($p=0.64$). Of these recurrences, 22.2% occurred later than one year.

Conclusions: There were no statistical differences between experience groups in recurrence or complication rates, but small sample sizes limit this conclusion. There was a statistical difference between surgical technique and recurrence rate. Additionally, the recurrence time often was later than the literature suggestion of one year, which may prompt further investigation into adequate follow up-times.

Rebecca Johnson-Paben, MS2 Mentor: Christopher Wu, MD

Poster Presenter, Clinical Research

Burden Incurred by Patients and their Caregivers Following Outpatient Surgery

Background: There has been a recent shift toward performing surgical procedures on an outpatient basis, in part due to cost savings by insurers and hospitals. Unidentified post-discharge economic, physical, and social burdens may be borne by patients and their caregivers. A prospective survey was developed to assess the economic and social burden on patients and their caregivers following outpatient surgery.

Methods: Preoperative surveys (IRB approved) were self-administered on the day of surgery. Surveys assessing postoperative recovery were administered via telephone on postoperative day 7. Validated survey instruments were used to assess patient recovery and the burden of informal caregiving. Additional survey instruments were constructed to quantify the extent of time away from the workplace, and to identify post discharge symptoms that interfere with recovery and return to work for both the patient and their caregiver.

Results: Thirty-nine adult patients and their caregivers were enrolled. Twenty-five patients and caregivers completed the 7-day postoperative telephone survey. At 7 days post-discharge, 12% of patients reported longer absence from the workplace than they anticipated. At that time, self-reported patient recovery was 71%, while self-reported independence from their caregiver was 82%. At follow up, 33% of employed primary caregivers reported additional unanticipated absence from the workplace. Primary caregivers reported the average burden of caregiving as a 4 on a scale from 0-10.

Conclusions: Informal caregiving after outpatient surgery may be an unrecognized economic and psychological burden.

Conservative estimates using federal minimum wage, an eight hour work day, and an average of 21 million outpatient surgical procedures performed annually in the United States indicate that more than 450 million dollars of unseen costs are incurred each year by patients and caregivers. In part, this represents cost shifting from third-party payers to patients and their caregivers.

Genevieve Kaunitz, MS2 Mentor: Kate Puttgen, MD

Poster Presenter, Clinical Research

Surgical outcomes of infantile hemangiomas receiving propranolol, corticosteroids, or expectant management

Background: Infantile hemangiomas (IH) are the most common benign vascular tumors in children. A subset may develop complications resulting in physical disfigurement and/or functional impairment, and require pharmacotherapy and possibly surgery. Treatment options include corticosteroids and propranolol, now considered first-line therapy. The efficacy of propranolol in conjunction with surgery has not been studied. This study examined potential aesthetic and/or functional differences in surgical outcomes of IH patients based on pre-operative treatment received.

Methods: A database was created of IH that were surgically treated by two pediatric plastic surgeons at Johns Hopkins Hospital between 2004-2013. Data was collected via retrospective chart review, including patient demographic information, IH characteristics, and treatment course. For a subgroup of patients, two pediatric dermatologists will perform additional visual outcome assessments using a set of pre- and post-operative photographs.

Results: 165 patients received surgery for 179 IH. Patients were predominantly Caucasian (77.6%) and female (73.3%). 33 patients (20.0%) received propranolol, 24 (14.6%) received steroids, and 107 (64.9%) did not receive treatment. IH located on the head and neck were more likely to be treated with propranolol ($P<.001$). Patients with IH that had complications were more likely to receive propranolol ($P<.05$) or steroids ($P=.001$). These patients also tended to be younger at first surgery, with a median age of 39.7 months ($P<.001$) and 42.5 months ($P<.05$), respectively, compared to 58.8 months for no treatment. Propranolol patients were younger at second surgery, with a median age of 42.3 months ($P<.01$) compared to steroids (54.7 months) and expectant management (75.0 months).

Conclusions: The greater number of complications in those receiving propranolol and steroids points to more severe IH in these patients, while only propranolol patients were younger at first and second surgeries. These results suggest that propranolol induced earlier regression of IH, which could result in better aesthetic and functional outcomes.

David Kidd, MS2 Mentor: David Feller-Kopman, MD

Poster Presenter, Clinical Research

An assessment of handheld digital manometer accuracy during thoracentesis

Background: The purpose of our study was to compare the accuracy of a handheld digital manometer with an electronic transducer manometer and U-tube water manometer during thoracentesis and in diagnosing non-expandable lung.

Methods: Thirty-three consecutive patients undergoing therapeutic thoracentesis were enrolled in the study. During the procedure, serial pleural pressure (Ppl) measurements were made by using a disposable handheld digital manometer (DM, Mirador Biomedical, Seattle, WA), electronic transducer system (ET), and U-tube water manometer (UT). End expiratory Ppl was recorded after catheter insertion, after aspiration of every 240 mL of fluid, and prior to catheter removal. Pleural elastance, which is change in Ppl (in cm H2O) divide by amount of fluid removed (in L), was calculated and used as an indicator of lung expandability. Volume of fluid removed, symptoms during thoracentesis, and fluid chemistries were also compared.

Results: Thirty of the thirty-three patients enrolled had manometry performed during their thoracentesis. There was a strong correlation between elastance for ET and DM ($R2=0.9582$, $P<0.001$). Correlation was poor for ET and UT ($R2=0.0448$, $p=0.84$). Among the 15 patients with cough, recorded transducer manometer pressures ranged from -9 to +9 cm H2O, with a mean (SD) = -2.93 (4.89), while the 9 patients with chest discomfort had recorded transducer manometer pressures that ranged from -26 to +6 cm H2O, with a mean (SD) = -7.89 (9.97).

Conclusions: Patient symptoms may not be a reliable measure of pleural pressure. The handheld digital manometer provided a valid method to measure pleural pressures during thoracentesis. When compared to the electronic transducer manometer, the digital manometer is easier to set-up and operate. The practicality of handheld digital manometers provides incentive for the adoption of pleural manometry during thoracentesis as standard of care.

Anne Kuwabara, MS1 Mentor: Bernard Cohen, MD

Poster Presenter, Clinical Research

Retrospective Study: Natural History of Uncomplicated, Viral Warts in Children

Abstract: Warts are benign lesions of the skin and mucosa caused by human papilloma virus. Warts have a 20% prevalence among children and are associated with significant social stigma. No treatment has been shown to be effective, and no reports have been made on their natural history since 1963. Better understanding of the pathogenesis of verruca vulgaris will help reassure patients and aid primary care providers in counseling families. To accomplish this goal, we conducted a telephone survey and retrospective medical chart review in a cohort of 214 patients treated at the Johns Hopkins Pediatric Dermatology Department from 2008 to 2012. Mean age at presentation was 8.9 years. Warts were mainly located on the hand (53.7%). The median time to resolution was 12 to <18 months. The three top therapies were salicylic acid (66.4%), cryotherapy (53.7%), and duct tape occlusion therapy (37.9%). The data produced two main findings. First, no therapy shortened time to resolution. Therefore, painful, destructive treatments may do more harm than good. Second, a history of frequent infections was associated with a prolonged time to resolution. Patients with histories of frequent infections may need immune stimulation for their warts to resolve. These results will inform physicians and patients on what to expect and reduce unnecessary procedures, costs and frustrations. Future studies should identify any therapies that can minimize the appearance of warts to reduce the stigma while immunity is being built against the virus. Limitations include selection and recall bias and small sample size. Overrepresentation of individuals of high socioeconomic status may occur because homes without telephones are excluded, and homes with multiple telephone lines are more likely to be selected. In addition, parents of patients may not correctly recall clinical information about their child's illness. Finally, statistical significance is limited by a small sample size.

Ryan Lange, MS2 Mentor: Matthias Holdhoff, MD

Poster Presenter, Clinical Research

Investigation of Circulating Proteins as Biomarkers for Malignant Gliomas

Background: No blood biomarker of clinical use has been found in glioblastoma patients despite a need in these patients for improved assessment of disease progression. This study sought to explore several peripheral candidate biomarkers in differentiating among glioblastomas (high grade tumors), low grade gliomas, and healthy controls.

Methods: We collected pre-surgical blood from 35 patients with brain tumors, including low grade (World Health Organiziation (WHO) Grade II, n=13) and high grade (WHO Grade IV, n=22) tumors, and compared these samples with healthy subjects (n=15). Using enzyme-linked immunosorbent assay, we measured plasma concentrations of eight proteins, including glial fibrillary acidic protein (GFAP), neurogranin, brain derived neurotrophic factor (BDNF), intracellular adhesion molecule 5 (ICAM-5), metallothionein-3 (MT3), beta-synuclein, S100B, and neuron specific enolase (NSE). Comparisons between protein plasma levels between groups were made using the Wilcoxon rank-sum test or the Kruskal-Wallis test.

Results: Plasma concentrations showed extensive overlap among brain tumor patients and healthy subjects, with detectable levels in all patient and healthy groupings alike. Plasma concentrations of ICAM-5 ($p < 0.01$) and BDNF ($p < 0.05$) were significantly different in glioblastoma patients relative to healthy subjects. Timing of blood collection as pre- or post-anesthesia significantly affected levels of ICAM-5 ($p < 0.05$). Gliosarcoma serum showed increased levels of 5 of 8 proteins, with significantly elevated levels of ICAM-5 ($p < 0.05$) and beta-synuclein ($p < 0.05$) relative to glioblastomas.

Conclusions: These findings suggest the eight proteins are not glioblastoma-specific biomarkers. Differences in protein levels are not large enough to adequately distinguish among healthy and patient categories in a clinical setting. However, the effect of anesthesia on protein levels is an important consideration for future studies involving similar methods, and gliosarcomas appear to be associated with substantially higher levels of some of the studied proteins which deserve further evaluation.

Abby Larson, MS2 Mentor: Edward Ahn, MD

Poster Presenter, Clinical Research

Cost Analysis of Endoscopic-Assisted Suturectomy with Postoperative Helmet Molding and Open Cranial Vault Repair of Sagittal Synostosis

Background: Endoscope assisted strip craniectomy (EAS) with postoperative helmet molding has established evidence for less associated morbidity than cranial vault remodeling (CVR) in the treatment of sagittal synostosis Previous studies have demonstrated reduced cost of EAS versus CVR in the first year of life. We aimed to compare inpatient and outpatient costs of the two procedures at a single institution.

Methods: Endoscope assisted strip craniectomy (EAS) with postoperative helmet molding has established evidence for less associated morbidity than cranial vault remodeling (CVR) in the treatment of sagittal synostosis Previous studies have demonstrated reduced cost of EAS versus CVR in the first year of life. We aimed to compare inpatient and outpatient costs of the two procedures at a single institution.

Results: 32 patients receiving EAS and 27 patients receiving CVR were identified. EAS was shown to have statistically less median total inpatient charges ($11,917; range $8,779-$33,694) than CVR ($15,916; range $10,530-$58,064) ($P<0.0001$). CVR patients accrued statistically higher charges for radiology, labs ($P<0.0001$), room and board, drugs ($P<0.001$), operating room, and therapy ($P<0.005$). Reimbursement rates were 99% for EAS and 97% for CVR. Median age at surgery (11.9 weeks vs 17.3 weeks), OR time (185.5 minutes vs 281 minutes), and average length of stay (1 vs 3 days) were less for EAS than CVR ($P<0.0001$). Anesthesia and supply costs did not differ between groups.

Conclusions: EAS is less costly than CVR in an inpatient surgical setting. In addition to decreased morbidity, EAS may be a cost effective option of an early diagnosis and treatment of sagittal synostosis.

Alexander Leyva, MS2 Mentor: Romergryko Geocadin, MD

Poster Presenter, Clinical Research

Electroencephalographic sleep as a new marker of good outcome in patients with acute encephalopathy: a 4-year observational study

Background: Acute encephalopathy in hospitalized patients is common and associated with high mortality. Preservation of physiologic sleep has been associated with favorable outcomes in acute brain injury, yet this has been an area of strikingly little research. We hypothesize that electroencephalographic (EEG) presence of sleep elements is associated with better outcome at discharge (defined as Glasgow Outcome Scale [GOS] score of 5) in adult patients with acute encephalopathy.

Methods: Design: Retrospective cohort

Setting: Johns Hopkins Bayview Medical Center

Subjects: Adult patients (n=142) with diagnosis of acute encephalopathy

Measurements: Clinical data (diagnoses, interventions, and medications), EEG characteristics, and outcome at discharge (GOS or death) were assessed. EEG's were interpreted regarding presence of sleep elements (K-complexes, vertex sharp waves, and sleep spindles). Associations between sleep elements and good outcome (GOS 5) were analyzed using multiple statistical analyses, including multivariate regression.

Results: Included were 142 consecutive encephalopathy patients from 2009-2012. Exclusionary criteria (n=13) included states with confounding neuropathophysiologic contributions (underlying hypoxic-ischemic brain injury, coma, or epileptiform seizures). All EEG's demonstrated encephalopathy and 38% had ≥1 sleep element. Patients without sleep elements were older (68.5 vs. 58, p=0.010) and septic shock was more common (10 vs. 0, p=0.014). Sleep elements were more frequent in patients with good outcome (GOS 5), and K-complexes were significantly and independently associated with good outcome, even after adjusting for confounders such as age and septic shock (OR= 2.79, 95% CI 1.16-6.69).

Conclusions: Though all sleep elements showed association with better GOS outcome in encephalopathic patients, the odds of good outcome at discharge (GOS 5) were nearly 2.8 times greater for patients exhibiting K-complexes on sleep architecture. While these findings should be confirmed in prospective studies, they provide exciting insight on the preservation of sleep elements as a marker for good outcome, as well as insight into sleep as a new possible therapeutic target.

Jana Lovell, MS1 Mentor: Justin McArthur, MD

Poster Presenter, Clinical Research

Longitudinal assessment of cognitive status and HAART treatment in an HIV-positive outpatient setting at the Johns Hopkins Hospital

Background: The prevalence of mild and asymptomatic neurocognitive impairment in HIV-positive patients remains as high as 45% despite the use of HAART. There is conflicting evidence as to whether HAART with higher CNS penetration effectiveness (CPE) is associated with better neurocognitive status. This study aims to examine whether changes in HAART CPE scores predict progression to HIV-associated neurocognitive disorder (HAND).

Methods: A retrospective analysis of HIV-positive patients who underwent neurocognitive evaluation at the Johns Hopkins Hospital (JHH) from 1999-2013 was performed. Changes in CPE and a 12-point HIV-dementia scale (HDS) scores were calculated for each patient visit. Our primary outcome of interest was HDS and living situation (living alone vs. assisted living) on final visit.

Results: Of 59 HIV-positive patients with neurocognitive impairment identified, 38 patients had at least one follow-up visit for a total analysis of 175 clinical visits. On initial presentation, mean age was 48 years (IQR 12.5), 34 patients (89.5%) were on HAART for at least 6 months, median CPE was 7 (IQR 3), and HDS was 7 (IQR 7). On most recent follow-up, mean age was 53 years (IQR 8), 37 patients (97.4%) were adherent to HAART for at least 6 months, median CPE was 9 (IQR 4), and HDS was 8 (IQR 5). The median HDS of 32 patients (84.2%) adherent to HAART throughout follow-up was 8 (IQR 5) while the median HDS of the 6 non-compliant patients (15.8%) was 6 (IQR 5) on final visit. On final presentation, 6 patients (15.8%) were in assisted living with median HDS of 5 (IQR 6) compared with 30 patients (78.9%) living alone with median HDS of 9 (IQR 4).

Conclusions: Adherence to HAART throughout follow-up, regardless of CPE, correlates with higher HDS scores, indicating improved neurocognitive status. Lower HDS scores correlate with poor outcome with regard to living situation.

Rebeccah McKibben, MS3 Mentor: Wendy Post, MD MS

Poster Presenter, Clinical Research

Elevated Levels of Monocyte Activation Markers Are Associated With Subclinical Atherosclerosis in the Multicenter AIDS Cohort Study (MACS)

Background: HIV-infected individuals have more atherosclerosis compared to HIV-uninfected individuals. Monocyte activation markers and pro-inflammatory chemokines are elevated in HIV and may be associated with coronary atherosclerosis. We hypothesized that levels of monocyte activation markers, soluble CD163 (sCD163) and CD14 (sCD14), and the pro-inflammatory chemokine, monocyte chemoattractant protein (MCP-1), would be associated with subclinical coronary atherosclerosis in the Multicenter AIDS Cohort Study (MACS).

Methods: The MACS is a prospective study of HIV-infected and -uninfected men. This nested case-control study included 566 HIV-infected and 340 HIV-uninfected men, and measured cardiovascular disease (CVD) risk factors, biomarkers, and performed non-contrast cardiac CT scans and coronary CT angiography to assess coronary plaque and stenosis. Associations between biomarkers and plaque presence were assessed using logistic regression, and associations with plaque extent using linear regression. Biomarkers were categorized into quintiles, with the lowest quintile as the reference group. Models were adjusted for age, race, HIV serostatus and CVD risk factors. Tests for interaction by HIV serostatus were performed.

Results: Soluble CD163, sCD14, and MCP-1 levels were higher in HIV-infected than HIV-uninfected men ($p<0.001$). sCD163 was associated with presence and extent of coronary artery calcium ($p=0.001$, $p=0.009$), presence of calcified plaque ($p=0.002$), mixed plaque ($p=0.01$) and any plaque ($p=0.04$), and presence of stenosis >50% ($p=0.03$). There were no interactions by HIV serostatus. sCD14 and MCP-1 were associated with coronary stenosis ($p=0.004$, $p=0.05$).

Conclusions: Soluble CD163, sCD14, and MCP-1 are elevated in HIV infection. Soluble CD163 is associated subclinical atherosclerosis, and sCD14 and MCP-1 are associated with coronary stenosis. Monocyte activation may play a unique role in the development of coronary atherosclerosis in HIV infection. Causation cannot be assessed because of the cross-sectional study design, and the exclusion of women limits the generalizability of results. Future research is needed to determine whether reducing monocyte activation could reduce the burden of coronary atherosclerosis.

Alexandra Miller, MS2 Mentor: Rebecca Gottesman, MD, PhD

Poster Presenter, Clinical Research

Perioperative low arterial oxygenation is associated with increased risk of stroke after cardiac surgery

Background: Postoperative stroke occurs in up to 5% of cardiac surgery patients, contributing significantly to mortality and morbidity. Patient characteristics as well as intraoperative factors have been associated with a higher risk of stroke. We hypothesized that poor systemic blood oxygenation in the perioperative period is associated with increased risk of stroke following CPB.

Methods: This was a case-control study of 311 adult patients who underwent cardiac surgical procedures at a single center from 2003-6. Patients having a postoperative stroke were matched 1:2 with controls. Minimum and average pO2 values, as measured from arterial blood gas values during and up to 24 hours after the start of surgery, were recorded and evaluated as continuous and categorical (in quartiles) predictors. Conditional logistic regression models adjusted for hypertension, diabetes, hyperlipidemia, bypass time, and prior stroke were used to evaluate associations between minimum and average pO2, each, and stroke status.

Results: Lower nadir pO2 values were significantly associated with postoperative stroke. Per 10 mm Hg decline in nadir pO2, odds of stroke increased nearly 25% (OR 1.23, 95% CI 1.09-1.39). Nonlinear models of oxygen levels predicting stroke were explored but results remained similar; the linear model had the best statistical fit. Each equivalent decrease in mean pO2 was associated with smaller but significantly increased odds of stroke (OR 1.08, 95% CI 1.01-1.15). Having a nadir pO2 value in the lowest vs highest quartile was associated with 3.66-fold increased odds of stroke (95% CI 1.65-8.14).

Conclusions: Odds of stroke after cardiac surgery is significantly increased in patients with a low minimum or average pO2 within 24 hours of surgery. This relationship is independent of other potential confounders of operative outcome.

Juan Munoz, MS2 Mentor: Alfredo Quinones, MD

Poster Presenter, Clinical Research

Extent of resection and residual volume thresholds affecting survival for patients with repeat resection of glioblastoma

Background: For newly diagnosed patients with glioblastoma multiforme (GBM), standard of care treatment consists of maximal tumor resection, radiotherapy, and chemotherapy. Unfortunately, virtually all patients with GBM eventually relapse despite aggressive initial treatment and survival times range from just a couple of months to several years. There is currently no standard treatment for recurrent GBM. A previous study established a link between extent of surgical resection (EOR) and residual volume (RV) with survival, and showed a significant increase in survival with EOR>70% and RV<5cm3. The purpose of this study was to establish the thresholds required to prolong survival for patients who are undergoing a repeat surgical intervention.

Methods: A retrospective review of adult patients who underwent surgery for GBM from 2007-2011 at Johns Hopkins was conducted and three-dimensional pre and post-surgical volumetric measurements were made using T1-weighted contrast MRIs. Multivariate regression analysis was used to evaluate the relationship between extent of resection and residual volume with survival in patients with a repeat craniotomy.

Results: Statistical analysis and results pending (Expected date of completion: Late December 2013).

Conclusions: This study aims to show the significance of EOR and RV in the survival of patients who have already undergone a previous resection with recurrence. These findings may help guide strategies to help optimize outcomes and to point towards what the standard of care treatment should be in this patient population.

Lynn Pauls, MS2 Mentor: Christopher Wu, MD

Poster Presenter, Clinical Research

The Impact of Weekend Admissions on In-hospital Mortality: A Systematic Review

Background: The phenomenon of increased mortality during the weekends compared to weekdays for hospitalized patients ("weekend effect") has been studied in many fields, yet its existence and origin are unclear. Several studies have found diverse correlations between the weekend and increased mortality while attributing various reasons for this occurrence (e.g. weekend versus weekday staffing patterns). Because of uncertainties surrounding this phenomenon in the literature, we performed a systematic review to examine the presence of a "weekend effect" on in-hospital mortality and its possible contributing factors.

Methods: A literature search was performed on PubMed, SCOPUS, EMBASE, and Cochrane databases. Included studies in the systematic review contained weekend (including holidays) versus weekday mortality data, weekend-admitted patients or weekday-admitted patients staying through the weekend, and were published in the English language. Excluded articles had weekend data merged with weekday nights. Extracted characteristics included study population demographics, location, staffing patterns, procedure-related data, and mortality outcomes.

Results: Of the 98 included studies, 39 (40%), 50 (51%), and 9 (9%) studies had positive, negative, and mixed weekend effects, respectively, with a median 15% increased mortality across all positive studies. For weekend staffing, 92% (22/24) of studies with no staffing difference had no increase in weekend mortality while 58% (35/60) of studies with different weekend staffing had increased mortality. Higher weekend mortality was also observed in 57% (4/7) of studies with delayed time-to-procedure on weekends, 60% (6/10) of studies with lower weekend procedure rates, and 70% (7/10) of studies with higher weekend illness severity.

Conclusions: Overall, our systematic review found that the literature is divided on the presence of the weekend effect. Staffing patterns, procedure rates/delays, and illness severity are all factors associated with increased weekend in-hospital mortality. However, because all studies were observational trials, causality for the weekend effect cannot be determined and remains unclear.

Thomas Rappold, MD/PhD or Student in Residence Mentor: Charles Hogue, MD

Poster Presenter, Clinical Research

Serum Biomarker Levels And Risk For Brain Injury after Cardiac Surgery

Background: The majority of neurological complications after cardiac surgery are clinically asymptomatic and manifest as "silent" brain infarction detected with MRI or cognitive decline measured with psychometric testing. Sensitive and specific serum biomarkers would facilitate early diagnosis of brain injury allowing for interventions to limit the extent of injury. The aim of this study was a) to assess for the temporal pattern of serum biomarker levels between patients undergoing cardiac surgery with a cohort undergoing non-cardiac surgery; and b) to evaluate for a potential relationship between serum biomarker levels and new ischemic MRI brain lesions.

Methods: Experimental biomarker data was collected from 186 patients undergoing cardiac surgery enrolled in a prospectively randomized trial of blood pressure management strategies based on cerebral autoregulation monitoring versus standard of care. Biomarker data for 247 shoulder surgery patients served as controls. Serum levels of brain derived neurotrophic factor (BDNF), inter-cellular adhesion molecule (ICAM-5), and glial fibrillatory acid protein (GFAP) were obtained after anesthesia induction before surgery, immediately after surgery, and on postoperative day 1 (POD1). Cardiac surgical patients (n=89) underwent diffusion weighted brain imaging (DWI) 4 to 7 days after surgery.

Results: Postoperative GFAP (0.00*) and BDNF (0.01*) levels were significantly elevated in cardiac patients. POD1 GFAP (0.01*) and ICAM-5 (0.00*) levels were significantly elevated. Eighty-nine (31%) cardiac patients underwent DWI imaging. Fifty (56.2%) of these patients had new ischemic lesions. Postoperative ICAM-5 levels were predictive of new ischemic lesions when using logistic regression (ß=-0.08, p=0.05, CI:-0.15,0.00).

Conclusions: Cardiac surgical patients experience increased levels of non-specific (ICAM-5) markers of inflammation as well as brain specific (BDNF, ICAM) inflammatory markers. Postoperative ICAM levels may be used to predict new ischemic lesions on MRI, and real time measurement may provide a means for prevention.

Ankita Saxena, MS2 Mentor: Nicholas Daelsio, MD

Poster Presenter, Clinical Research

Implications of Pre-operative Polysomnography Parameters for Post-operative Respiratory Complications in Children undergoing Adenotonsillectomy

Background: Adenotonsillectomy (AT) is a pediatric surgery for the treatment of sleep disordered breathing (SDB) and obstructive sleep apnea (OSA). Children with upper airway problems are at greater risk for respiratory compromise after AT, and understanding factors that predict post-operative complications can increase patient safety. The purpose of our study was to examine the relationship between pre-operative polysomnography parameters and post-operative respiratory outcomes in children with OSA undergoing AT.

Methods: A retrospective analysis of 639 children presenting for AT in 2011 was conducted. Pre-operative polysomnography parameters recorded included respiratory disturbance index (RDI), oxygen saturation nadir, peak end-tidal carbon dioxide (EtCO2), and duration of elevated CO2 (>50 mmHg). Post-operative respiratory outcomes were reported as oxygen saturation nadir in the 2 hours following AT, and respiratory complication was defined as desaturation below 90% on pulse oximetry. Of the 639, 41 were excluded for coexistent genetic abnormalities and 310 for incomplete data. Data analysis was performed on 288 and included Spearman correlation and Mann Whitney U test.

Results: Of 288 patients, 160 (55.6%) were male; 142 (49.3%) were African-American, 91 (31.6%) were white, and 55 (19.1%) were other. Mean age was 6.69 ± 3.64 years. Correlations between pre-operative polysomnography parameters (RDI, EtCO2, saturation nadir) and post-operative oxygen saturation levels were not significant (p=0.8974, p=0.4531, p=0.2469 respectively). Patients that desaturated below 90% (n=7) post AT were significantly more likely to have higher RDIs (p= 0.0062) and lower oxygen saturation nadirs (p=0.0012) than those that did not desaturate (n=281). No significant difference in EtCO2 or duration of elevated CO2 was observed in the two groups.

Conclusions: Pre-operative polysomnography parameters such as RDI and oxygen saturation nadir may be helpful in identifying children at greater risk for respiratory complications post AT.

Andrew Scott, MS2 Mentor: Mark Schoenberg, MD

Poster Presenter, Clinical Research

Perioperative Thermoregulation Compliance Effectively Prevents Hypothermia

Background: The perioperative maintenance of normothermia has been shown to improve post-operative outcomes. Hypothermia occurs during surgery because anesthesia induces poikilothermia. A body temperature change of 1° C can significantly contribute to intra- and post-operative morbidity. We investigated the effect of compliance to the Surgical Care Improvement Project (SCIP) measure Inf-10 (thermoregulation measure) on the maintenance of normothermia. To be compliant with this SCIP measure, a surgical patient must have had forced-air warming during surgery for procedures lasting ≥ 60 minutes if general or neuraxial anesthesia were used.

Methods: We analyzed records from inpatient surgeries (n=66,064) at The Johns Hopkins Hospital from 2010-2013. We excluded cases receiving MAC (Monitored Anesthesia Care), cardiac surgeries, and outpatient surgeries. The compliance with SCIP Measure Inf-10 and the relationship to corresponding post-operative patient temperatures was evaluated. The first measured post-operative core temperature upon admission to the PACU or ICU was the primary outcome. Data are given as mean ± SD and $P < 0.05$ significance was defined as $P < 0.05$.

Results: 63,954 surgeries met the SCIP measure for thermoregulation and 2,110 did not. Mean temperatures were 36.6 ± 0.5° C and 35.6 ± 0.4° C; $P<0.001$, respectively.

Conclusions: These results show a statistically and clinically significant difference of 1.0° C for the mean initial post-operative body temperatures for compliant versus noncompliant surgeries. Based on substantial evidence showing adverse outcomes in hypothermic patients as well as the effectiveness of SCIP compliance in maintaining normothermia, we conclude that SCIP Measure Inf-10 non-compliance contributes to an increase of adverse outcomes and costs for the healthcare system.

Jessica Selter, MS2 Mentor: Eric Kossoff, MD

Poster Presenter, Clinical Research

Can you fine-tune the ketogenic diet in pediatric epilepsy?

Background: The ketogenic diet (KD) is used alongside medication in treating children with refractory epilepsy. Although this treatment has been shown to be effective, some children's seizures still are not fully controlled. In these situations, doctors often begin fine-tuning the KD, however, the impact of these adjustments on seizure outcome remains unknown. This study sought to characterize the efficacy of these treatment modifications.

Methods: A retrospective chart review was performed of the most recent 200 children that started the KD at Johns Hopkins Hospital. The ten most common dietary/supplement changes, and any medication adjustments, were reviewed from patient records to assess seizure outcome. A maximum of four interventions per child were included. Successful outcome was defined as a documentation of >50% seizure reduction after a change.

Results: Of the 156 patients with at least one treatment modification, 265 interventions were made for seizure control. Overall, one-fifth of patients had at least one successful intervention. There was a 42% chance that an intervention led to any improvement in seizure control, an 18% chance that an intervention would be successful, and a 3% chance of resultant seizure freedom. The likelihood of success did not decrease with each subsequent intervention (p=.44). Upon further characterization, a trend towards medication adjustments being more successful than dietary modifications was observed (24% vs. 15%, p=0.08). Of the dietary interventions, no single modification stood out as most effective. When dietary modifications were stratified by adjustments of calories, ratios, supplements, or fasts, there was no significant difference in seizure success between intervention groups (p=0.58).

Conclusions: These findings suggest that fine-turning the KD can benefit some patients with refractory epilepsy, however, it rarely eliminates seizures completely. Furthermore, the results imply that medication adjustments for children on the KD might be a more viable option, if the original treatment is not meeting seizure control expectations.

Debebe Theodros, MS2 Mentor: Michael Lim, MD

Poster Presenter, Clinical Research

Efficacy of Primary Microvascular Decompression versus Subsequent Microvascular Decompression for Trigeminal Neuralgia

Background: Microvascular decompression (MVD) is considered the gold standard treatment for patients with medically intractable trigeminal neuralgia (TN). No study has compared the success rates of patients who undergo MVD as their first surgical intervention versus patients who undergo MVD as a subsequent surgical intervention.

Methods: Retrospective chart review revealed 936 patients treated for TN at the Johns Hopkins Hospital (JHH) between 1998 and 2010. We excluded patients whose MVD was not performed at JHH, patients with components of atypical pain, multiple sclerosis, epidermoid tumors and those lost to follow-up. There were 175 patients included in the final analysis of time to symptom recurrence and overall MVD durability.

Results: For patients whose MVD was their first surgical intervention, 79% experienced complete pain relief, 6% experienced complete pain relief with medications, 7% experienced improved pain control and 7% experienced no pain relief. For patients whose MVD was a subsequent surgical intervention, 74% experienced complete pain relief, 6% experienced complete pain relief with medications, 9% experienced improved pain control and 11% experienced no pain relief. In patients whose MVD was their first surgical intervention, the source of compression was arterial in 58%, venous in 11%, both in 23%, neither in 2%, and none in 6%. In patients whose MVD was a subsequent intervention, the source of compression was arterial in 55%, venous in 17%, both in 23%, none in 2%, and unspecified compression in 2%. A Kaplan-Meier relapse-free survival curve is currently pending.

Conclusions: Our reported success rates for patients initially versus subsequently treated by MVD were 79% and 74%, respectively. The similar success rates suggest MVD can be employed as either a primary or subsequent surgical intervention for patients with medically intractable TN.

Alan Utria, MS2 Mentor: Amir Dorafshar, MBChB

Poster Presenter, Clinical Research

What is the Optimal Age for Cranial Vault Remodeling in Syndromic Craniosynostosis?

Background: Syndromic craniosynostosis is a genetically-determined condition resulting in the premature fusion of any one of the calvarial sutures and requires surgical intervention to correct. Optimal timing for the surgical intervention in patients with syndromic craniosynostosis is controversial.

Methods: Retrospective chart review was performed for 58 patients surgically treated for syndromic craniosynostosis at Johns Hopkins Hospital between 1990-2013. Surgical procedures were assigned a Whitaker category based on need for reoperation. Multivariable logistic regression analysis was performed to determine the relationship between age at surgery and need for reoperation as categorized by the Whitaker scale, and to assign odds ratios (OR) for need for surgical revision by operative timepoint.

Results: Whitaker category for the 71 procedures was as follows: 31 in category I, 10 in category II, 3 in category III, and 27 in category IV. Multivariable logistic regression analysis for the effect of age on reoperation revealed a greater odds of major reoperation (category IV) in patients with less than 3 months of age (OR 5.6, p=0.015, 95% CI: 1.4-24.7) and 3-6 months of age (OR 4.3, p=0.03, 95% CI: 1.2-16.1), and a greater odds of no reoperation necessary (category I) in patients 6-9 months of age (OR 7.0, p=0.006, 95% CI: 1.7-27.9). Patients older than 12 months of age had a greater odds (OR 8.4, p=0.011, 95% CI: 1.6-43.2) of requiring minor operative revisions (category II).

Conclusions: Timing of surgery is an important factor to consider when planning vault remodeling in syndromic craniosynostosis. We found that operating before 6 months of age had greater odds of requiring a complete revision, and that patients undergoing remodeling after 12 months of age were more likely to require minor revisions. In our experience, the ideal operative window that demonstrated the greatest odds of requiring no additional surgery was 6-9 months of age.

Johnny Xie, MS2 Mentor: Lynette Mark, MD

Poster Presenter, Clinical Research

The Difficult Airway Response Team (DART): A Five-year Overview of an Intervention to Manage In-hospital Airway Emergencies

Abstract: Difficult airway events are catastrophic for patients, families, and healthcare professionals and can lead to devastating complications. Between 2006 and 2008, multiple sentinel events occurred at our institution, prompting a root cause analysis to establish strategies for improving airway management. In 2008, the Difficult Airway Response Team was created and comprised of attending anesthesiologists, otolaryngologists, trauma surgeons, emergency medicine physicians, and senior house staff.

The first 2 years of DART focused on operations and education about complex airway management. In the subsequent 3 years, DART expanded to include airway equipment carts located at 11 locations throughout the hospital, a web-based registry to report and track cases, and quarterly educational programs for participating physicians.

A total of 385 adult DARTs occurred in the past 5 years, representing nearly 10% of code requests. DARTs were emergently transported to ORs for optimal airway management in 62 (16%) cases. Patient characteristics are analyzed for this cohort, and common features are: 25 patients (40%) have a history of difficult airway, 21 (33%) have a history of head & neck tumors, and 19 (31%) have angioedema during the events. Of 385 DARTs, 23 cases required surgical airways: 9 (39%) have a history of head & neck tumors, 9 (39%) have airway bleeding during events, and 8 (35%) have a history of difficult airway. Other variables include BMI, airway techniques, and event deaths. Additionally, operations metrics, such as reasons for DART activation, personnel and specialized equipment, and response time, are analyzed.

Airway sentinel events have been reduced to 0 in the past 5 years of DART operation. DART also helped to identify significant patient risk factors for initiating advanced airway management. Ongoing multivariate risk factors analysis is directed to refining the DART protocol and improving the effectiveness and quality of care at our institution.

Jennifer Yeh, MS2 Mentor: Joseph Michael Collaco, MD

Poster Presenter, Clinical Research

Weaning of Home Oxygen in Infants with Bronchopulmonary Dysplasia

Background: Preterm infants with bronchopulmonary dysplasia (BPD) often require home supplemental oxygen. Little is known about the nature of oxygen use cessation in these patients, and recommendations for weaning and clinician practices vary. The objective of this study was to describe and identify predictors of the timing and method of oxygen weaning.

Methods: Subjects (n=420) were recruited from the Johns Hopkins BPD outpatient clinic. Timing, method, and predictors of oxygen weaning in these BPD patients were assessed by chart review. Statistical analyses included t-test, chi-squared test, linear and logistic regressions, and Kaplan-Meier curves performed in STATA.

Results: Of the 420 subjects, 154 subjects received home supplemental oxygen, and 124 of these subjects were weaned off oxygen at time of follow-up at a median age of 10.9 months. Weaning occurred at a later age when subjects had gastrostomy tubes (6.44 months later, P = 0.001) or were older at their first visit to the BPD clinic (0.70*(age at first visit) months later, P = 0.007). Weaning was not supervised by a medical provider in 30.6% of the 124 weaned subjects. Unsupervised weaning was associated with a diagnosis of pulmonary hypertension (OR = 3.53, P = 0.010) and having public versus private insurance (OR = 2.64, P = 0.043), and trended towards association with nonwhite race (OR = 2.60, P = 0.058) and a household income greater than the US median (OR = 2.63, P = 0.057). Weaning time and method were not associated with sex, gestational age, birthweight, or oxygen flow.

Conclusions: Rates of supervised oxygen weaning are lower in certain demographic and socioeconomic groups, as well as in children with specific co-morbidities. This may reflect the need for targeted education of caregivers by clinicians and the importance of examining health care access across these groups.

Mingjuan Zhang, MS2 Mentor: Henry Jampel, MD

Poster Presenter, Clinical Research

Single Intraocular Pressure Measurements Cannot Approximate the Mean of Multiple Same-Day Measurements in Glaucoma Surgical Trials

Background: Little is known about the necessity of multiple same-day intraocular pressure (IOP) measurements versus a single measurement in describing the effect of IOP-lowering surgical procedures, and such evidence could affect surgical trial recruitment and retention.

Methods: 609 patients with primary open-angle glaucoma and cataract from the pre-randomization phase of the COMPASS CyPass Micro-Stent randomized controlled trial underwent one IOP measurement while taking usual medications to lower IOP and three diurnal IOP measurements at 8am, 12pm, and 4pm after undergoing a 2-4 week washout of all IOP-lowering drops. The main outcome was the proportion of eyes in which the increase in IOP after washout, using the mean of the three measurements, was >0.5, 1, 1.5, or 2mmHg from the increase in IOP using only one of the after-washout measurements. A proportion of ≤10% at the 1.5mmHg cutoff was considered clinically acceptable.

Results: The mean IOP before washout was 18.5±4.0mmHg. The mean increase in IOP after washout using the mean of the three measurements was 5.3±4.2mmHg. At a difference cutoff of 1.5mmHg between a single after-washout IOP and the mean after-washout IOP, 35%, 26%, 34%, 30%, and 31% of eyes exceeded that difference at 8am, 12pm, 4pm, a randomly chosen one of the three times, and the time closest to that of the before-washout IOP, respectively. By logistic regression, the 12pm after-washout IOP had the lowest proportion of eyes differing from the mean ($p<0.001$) and thus most closely approximated the mean diurnal IOP measurement.

Conclusions: Although eliminating multiple IOP measurements would simplify the conduct of surgical trials in glaucoma, our data show that using a single IOP measurement after washout does not adequately approximate the mean of multiple IOP measurements. Further evaluation is needed after the COMPASS trial is complete to determine whether single IOP measurements might have applicability for post-surgical IOP characterization.

Jiawei Zhao, MS2 Mentor: Prem S. Subramanian, MD PhD

Poster Presenter, Clinical Research

Pseudoisochromatic plate testing: are we measuring color vision or something else?

Background: Color vision testing with pseudoisochromatic (PIP) plates [Hardy-Rand-Ritter (HRR), Ishihara] is a typical part of the neuro-ophthalmologic examination, and abnormal responses are often used as evidence of optic neuropathy. However, color disc arrangement tests such as the Farnsworth D-15 are the gold standard for detecting and classifying color vision deficits. The aim of this study was to determine if apparent color vision deficits on HRR and Ishihara plate testing represent truly aberrant color vision or indicate a decrement of other psychovisual parameters.

Methods: Forty-seven subjects (age 18-65) were recruited prospectively from an outpatient clinic. The study group included patients diagnosed with optic neuropathy (n=23), retinal dystrophy (n=3) and dry eye syndrome (n=1), and controls (n=20). Individuals with Va<20/200 or with congenital color blindness were excluded. All subjects underwent a comprehensive eye examination including visual acuity, color-vision and contrast sensitivity testing. Color vision was assessed using HRR and Ishihara PIP plates and Farnsworth D-15 hue discrimination test. Contrast sensitivity was measured using Pelli-Robson contrast sensitivity charts.

Results: HRR score and contrast sensitivity (CS) were correlated (Kendall's correlation=0.31, $p<0.001$), with no relationship between HRR score and Farnsworth D-15 score (Kendall's correlation=0.06, $p=0.250$). On multivariate analysis, CS ($\beta=8.36$, $p<0.001$) and visual acuity ($\beta=1.92$ $p=0.025$) both showed association with HRR scores. Ishihara score weakly correlated with CS (Kendall's correlation=0.16, $p=0.016$) but did not correlate with Farnsworth D-15 score (Kendall's correlation=0.04, $p=0.363$). HRR score had a stronger relationship with CS than did the Ishihara score ($p=0.014$).

Conclusions: Both Ishihara and HRR PIP testing appear to measure contrast sensitivity in a visual acuity-dependent manner; they do not accurately assess color vision. HRR is a more sensitive measure of contrast sensitivity deficits than is the Ishihara PIP set.

HISTORY OF MEDICINE

POSTER ABSTRACTS

Listed Alphabetically

James Aluri, MS2 Mentor: Daniel Todes, PhD

Poster Presenter, History of Medicine

The Role of the Humanities in Medical Education: Thoughts from William H. Welch

Abstract: Discussions on the humanities' place in medical education are not new. Over a century ago, William Henry Welch, a leading advocate for modern scientific medical education, frequently argued for the importance of certain humanistic subjects alongside scientific ones.

Prior scholarship on Welch cites his interest in history, literature, and the classics as evidence of a well-rounded intellect, but does not explore their relationship to Welch's views on medical education and the medical profession. This paper does just that. I rely upon a close reading of Welch's personal correspondence, manuscripts, published papers and speeches to analyze the evolution of his beliefs on the role of the humanities in medical education.

Until the 1920s, Welch believed that the primary value of humanistic subjects to the scientific physician, as a professional, resided in their cultivation of the "spirit of inquiry." Welch believed that a collegiate liberal education, which included both sciences and the humanities, and the study of the history of medicine would cultivate the necessary "spirit of inquiry" in aspiring physicians. For Welch, this "spirit" became a part of his own intellectual development during his days as a student in Germany.

His rationale for the importance of the humanities changed in the mid-1920s, when he argued that the value of the history of medicine to the scientific physician resided, not solely in its cultivation of the "spirit of inquiry," but also in its humanistic content. At that point, he saw the history of medicine as a tool to re-direct the medical profession away from its exclusive focus on amassing factual knowledge through experimentation and toward its role in human society.

Michael Claiborne, MS2 Mentor: Randall Packard, PhD

Poster Presenter, History of Medicine

Alternative Medicine in Maryland: Institutional Philosophy and Program Development

Abstract: The use of complementary and alternative medicine (CAM) in the United States, as defined as practices or treatments outside of allopathic orthodoxy, has risen dramatically over the past two decades. In 2007, more than 80 million Americans spent $33.9 billion out of pocket on CAM therapies, numbers that are only expected to rise in coming years. Introducing this controversial and variably-defined field to academic medical centers in the United States has been fraught with conflict, and the state of Maryland has proven to be no exception. Both major academic medical centers and their affiliated teaching hospitals, The University of Maryland and Johns Hopkins University, have established programs that both teach and promote the use of CAM. Through analysis of the content of press releases, primary source documents, and interviews with faculty, this paper explores the various factors that worked for and against the formation of CAM programs at these two schools. I argue that differences in institutional philosophy affected the ways that the two schools organized their CAM programs, progressed with CAM research, and promoted their services to the public. The histories of these two schools are illustrative of the way American consumers have simultaneously embraced and rejected aspects of CAM and have implications for CAM's continued persistence into the 21st century of American medical practice.

Jesse Cohen, MS2 Mentor: Jeremy Greene, MD PhD

Poster Presenter, History of Medicine

The Didactic Diagram: What the Acid-Base Nomogram Can Teach Us About Information Technology in Health Care

Abstract: As our health care system embraces the age of "Big Data," physicians' use of computer-based clinical decision support systems will increase. Some worry that a greater dependence on these digital technologies to diagnose diseases will supplant doctors' critical thinking and hinder medical students' education. To address these concerns, it is helpful to investigate the impact of early information technologies on medical knowledge and practice. One such tool is the acid-base nomogram, devised almost a century ago to speed the calculation of the acid-base parameters of blood. Akin to a paper slide rule with three axes, the nomogram applies the Henderson-Hasselbalch equation to interpolate measurements of pH, bicarbonate and arterial CO2, revealing a patient's acid-base status as "pathologic" or "normal." The modern nomogram further classifies a disturbance as renal or pulmonary in origin, thus guiding the clinician's selection of additional tests or treatments. In this paper, I compare competing versions of nomograms to construct a history of clinical practice and medical pedagogy in the field of acid-base disorders. Over time, different nomograms were used to theorize, summarize, debate and teach, as lab discoveries were brought into the clinic and classroom. With examples and commentary from academic journals, clinical textbooks, physician pocket references and conference transcripts, I reveal how a supposedly static technology adapted to serve the often-disparate needs of physiologists, clinicians and medical students. The story of the nomogram shows how new knowledge can be created, consolidated and shared with the help of information technology. However, it also raises important and timely questions regarding the interaction between physicians and their reference tools. It offers insight into how these tools can be used to enhance physicians' knowledge rather than replace it.

Alim Ramji, MS2 Mentor: Gianna Pomata, PhD

Poster Presenter, History of Medicine

Montaña de Monserrate's *Libro de la Anathomia del Hombre*, Galenism explored through dream"

Abstract: The 16th century marked a vibrant revival of human anatomical research in medicine, typically exemplified by Vesalius and his landmark De humani corporis fabrica, published in 1543. In 1550, however, the first anatomy text in Spanish was published entitled Libro de la Anathomia del Hombre, its author an Italian-trained physician-surgeon named Bernardino Montaña de Monserrate. Whereas Latin was the language of learned medical and surgical authorities, Montaña's treatise provided literate Spanish physicians and surgeons unfamiliar with classical training a means of advancing their knowledge of Vesalian anatomy through their own vernacular. Organized in two parts, one principally dedicated to anatomical descriptions and the other devoted to analyzing a benefactor's dream, Montaña's book aimed at an even wider audience. While the text itself focused on being of utility, it also hoped to be accessible by those who simply wished "to learn the secrets of nature". My primary methods have involved translation of the primary text with paleographic and literary analysis aimed at qualifying Montaña's sources and exploring his use of dream as a medical literature. Montaña's work is primarily rooted in Galenic doctrine and seeks to harmonize Galenic physiology with the growing movement towards ex vivo dissection. The use of dream helps further this purpose by employing common metaphors between the human body and structured society, drawing heavily from Henri de Mondeville's Chirurgie. Dreams were treated with a celestial quality in the 16th century, and like Lobera de Ávila's medical text Remedio (1542), Montaña uses it as a form of authority and authenticity. Exploring this type of work as a medical genre helps inform our understanding of the subtleties in medicine's practice during a period between conceptual paradigms. By clarifying one of the many mechanisms involved in the shift, this project helps reintroduce a somewhat forgotten figure and his peculiar work.

MEDICAL HUMANITIES, BIOETHICS, and the HEALING ARTS

POSTER ABSTRACTS

Listed Alphabetically

Benjamin Bautz, MS2 Mentor: Jeffrey Kahn, PhD

Poster Presenter, Medical Humanities/Bioethics

Can Beauchamp and Childress Justify Their Famous Principles of Biomedical Ethics? Why a More Complete Common Morality Theory Is Needed

Background: Tom Beauchamp and James Childress' "Principles of Biomedical Ethics" remains arguably the most influential publication in bioethics since the field's inception. In the most recent edition of "Principles," Beauchamp and Childress aim to justify their four principles – principles of respect for autonomy, non-maleficence, beneficence, and justice – by claiming they are selected from the common morality, the set of norms endorsed by all morally serious persons. This move has been discussed at length in the literature, but debate has largely ignored the issue most salient from a normative ethics perspective: why the common morality is of normative interest in the first place.

Methods: I conducted a review of over 50 articles and books related to Beauchamp and Childress' bioethical theory and developed my own novel critique of their approach, informed and validated by an in-person meeting with Beauchamp.

Results: Despite the common morality's foundational role in "Principles," Beauchamp and Childress defend neither their assertions about its content nor their assertion of its normativity. Because these content and normativity claims form the backbone of their argument for the significance of the four principles, they ought to be substantively defended in order to deliver on the normative project of the book. I evaluate three proposed approaches to mounting such a defense, arguing that only one – conceptual analysis – might succeed. The others fail for differing reasons: An appeal to empirical data cannot bridge the is-ought gap, and an appeal to ethical theory contravenes Beauchamp and Childress' metaethical paradigm.

Conclusions: Thus far in bioethics, much has been staked on the notion that certain values are important to us. If "Principles" is to be taken seriously as an attempt to defend the universal moral significance of some of these values, Beauchamp and Childress owe a well-developed account of what the common morality is and why it is ethically important.

Zachary Enumah, MS1 Mentor: Ato Onoma, PhD

Poster Presenter, Medical Humanities/Bioethics

Refugee Perceptions of Healthcare: A Participatory Assessment of Healthcare Delivery, Nyarugusu Refugee Camp, Kigoma, Tanzania

Background: The quality and delivery of healthcare services remains a key issue in Tanzania and throughout sub-Saharan Africa. In refugee and internally displace person (IDP) settings, such standards are created and maintained primarily by the United Nations High Commissioner for Refugees (UNHCR).

Methods: The study was conducted through a qualitative method in Nyarugusu camp, Kigoma Tanzania in December 2011 in Nyarugusu camp. The methodology will consist of interviews, focus group discussions, holistic observation informed by anthropological studies, literature, and other materials (e.g. photos). Forty refugees participated in discussions and subsequent analysis and data was based on photos, camp tours and participant observation at health center during both open and closed hours.

Results: With a camp population of 63,000 refugees mostly from Congo, the current health services—in the opinion of the respondents—is satisfactory. The health centre and complex is run by a collaborative effort, and a large number of nurses, and other health practitioners, such as nutritionists and reproductive health experts work in the centre. Most refugees responded positively to the prompt of the good aspects of healthcare in the camp, primarily because all health services are offered for free of charge. The health education program run by the Red Cross works with over 100 refugee health care educators participating in the program. Long wait times and lack of medication remain key issues. Positive benefits for pregnant woman, such as the provision of mosquito nets and blankets were cited.

Conclusions: Generally, the refugee participants cited numerous positive aspects of health services with room for improvement.

Mariam Fofana, MD/PhD or Student in Residence Mentor: N/A

Poster Presenter, Medical Humanities/Bioethics

"Subject to the same diseases, Heal'd by the same means?": Race and American Medicine

Abstract: Controversies and debates surrounding race have long been a fixture in American medicine. In the past, the biological concept of race—the idea that race is biologically determined and meaningful—has served to justify the institution of slavery and the conduct of unethical research trials. Although these days may seem far behind, contemporary debates over the race-specific approval of drugs and the significance of genetic differences are evidence that race still yields tremendous influence on medical research and clinical practice.

In many ways, the use of race in medicine today reflects the internalization of racial hierarchies borne out of the history of slavery and state-mandated segregation, and there is still much uncertainty over its benefits and harms. For example, although using race in research can help elucidate disparities, the reflexive use of race as a variable runs the risk of reifying the biological concept of race and blinding researchers to important underlying factors such as socioeconomic status. In clinical practice, the use of race in assessing a patient's risk of certain conditions such as sickle cell turns harmful when the heuristic becomes a rule.

This work aims to explore historical and contemporary controversies surrounding race in American medicine in order to elucidate the ways in which the biological concept of race remains alive--and harmful--in American medicine today, and spark discussion on current practices in clinical care, research and education that unwittingly perpetuate biases and unjust treatment. By learning from the past, today's students and physicians will be better armed to discern—and correct—the ways in which contemporary medicine perpetuates historical injustices.

Alicia Gaidry, MS2 Mentor: Paul Hoehner, MD

Poster Presenter, Medical Humanities/Bioethics

Influences on Naval Physicians' Ethical Decision-Making: The Contributions of Pre-Deployment Ethics Training

Background: Military physicians serving overseas in cross-cultural settings face the challenge of meeting patients' needs and adhering to their personal and professional ethics while abiding by military obligations and duties. The unconventional and guerrilla-style warfare in the Global War on Terror has introduced ethically challenging dilemmas that are cross-cultural and complex. This study sought to determine the perceived effectiveness of pre-deployment ethics training received by Naval physicians and to evaluate contribution of different types of ethics training on Naval physicians' ability to effectively manage ethically challenging scenarios while on deployment.

Methods: We administered an online survey to 436 Naval physicians who were deployed in the last 20 years and who are currently working at the Walter Reed National Military Medical Center. Data was collected using SurveyMonkey and analyzed using STATA.

Results: Of the 49 respondents, 16.3% did not report receiving any form of ethics training prior to deployment. Of those that received ethics training prior to deployment, 92.7% found the ethics training received was helpful in some way while on deployment. While a medical school course was most contributory overall to their ability to handle ethically difficult situations while on deployment (70.7%), what would help them better handle these types of situations would be a mandatory military training/military course (63.2%) or personal mentorship (57.9%).

Conclusions: This data suggests that a considerable number of Naval physicians receive no ethics training prior to deployment, the majority of Naval physicians who received ethics training considered it helpful for deployment, pre-deployment ethics training for Naval physicians is received in many forms, and Naval physicians consider "professional ethics as a physician" more strongly than "formal military ethics training" when managing ethically challenging scenarios. Further research in this area is warranted.

Katherine Press, MS2 Mentor: Michael Fingerhood, MD

Medical Humanities/Bioethics

What Patients with Addiction Disorders Need from their Primary Care Providers: a Qualitative Study

Background: Substance abuse is a common medical problem and is largely treated by primary care physicians. Though a strong doctor-patient relationship is important for the care of these patients, there is little work documenting patient's perspectives on what facilitates such connections. The purpose of this study was to identify positive and negative attributes of relationships between primary care physicians and patients struggling with addiction. We also sought to describe participants' views of health and healthcare.

Methods: We conducted in-depth semi-structured interviews with 18 demographically diverse patients enrolled in the Johns Hopkins Bayview Comprehensive Care Practice. All patients suffered from either current or prior addiction and were engaged in regular relationships with a primary care provider. Interview transcripts were independently coded by two readers and compared for agreement.

Results: Analysis identified numerous themes that were separated into two categories. Sample themes are included below.

1. Qualities of Doctor-Patient Relationships

-Personal relationships: Having been "pushed aside" and "judged" previously, it is essential that physicians are "caring and loving."

-Providing hope: Physicians must help patients "feel a little warmth about your situation" to help them go "forwards not backwards."

2. Views of Health and Healthcare

-Thinking about health during addiction: The most striking feature is huge variation, from apathy to stealing multivitamins.

-Internalized oppression: Many participants echoed uncertainty about whether they or other "dope fiends" deserve doctor's care and caution that physicians need a good "bullshit radar."

Conclusions: Our findings suggest that what participants need most from their doctors is compassion and hope. The variation in patients' concern with health during active addiction may mean that at least some are amenable to regular care, so long as they are made to feel deserving and welcome. All of these characteristics are within reach of most physicians.

Julia Riddle, MS2 Mentor: Susan Sherman, PhD

Poster Presenter, Medical Humanities/Bioethics

Painkillers, Transactional Sex, and Exotic Dance Clubs in Baltimore, MD

Background: Transactional sex in exotic dance clubs has been linked to the initiation and escalation of illicit drug use, including heroin, crack, and cocaine. This study sought to evaluate the perceived prevalence of prescription painkiller use as well as the association between painkiller use and unprotected transactional sex in Baltimore exotic dance clubs.

Methods: Surveys (n = 316) were administered via tablet to exotic dance club staff over the age of 18, who were employed for at least three months in 26-sex clubs in Baltimore City and surrounding suburbs (of 35 clubs approached). Nested logistical regression will be used to analyze questions related to drugs (heroin injected/snorted, crack cocaine, ecstasy, alcohol, pot, painkillers), sale of sex (oral, anal, vaginal), use of condoms, and position in club (dancer versus non-dancer) all with 5-pt Likert scale ratings.

Results: Painkillers had the third highest perceived prevalence (44%) after drinking (86%) and pot (54%) but ahead of heroin-snorted (16%) or injected (15%), ecstasy (23%), and crack smoked (17%). Nested analysis by club will explore the association between the sale of sex and the use of condoms, with reported use of painkillers, controlling for other substances.

Conclusions: As hypothesized, the perceived prevalence of prescription painkiller use in Baltimore exotic dance clubs is high. The association of painkiller use with risky sexual behavior (after controlling for drinking, pot, heroin, crack, and ecstasy) is being analyzed. Future research should determine (1) if painkillers are being used on prescription, misused, or abused; (2) how painkillers are introduced and used with other substances; and (3) a deeper understanding of the role painkillers in the initiation and maintenance of transactional sex. These findings can inform public health efforts to educate this population on the effects of painkiller abuse in an effort to reduce potential disease transmission from unprotected sexual contact.

Samuel Scharff, MS3 Mentor: Emily Frosch, MD

Poster Presenter, Medical Humanities/Bioethics

"Essence to Essence": Reclaiming personal and professional identity through creative expression.

Background: Life happens to healers too—and sometimes it leaves wounds. Art and literature have long observed this, making note of "wounded healers" in many works throughout history. These characters actively learn from their own suffering, translating their pain into meaningful lessons about living life and healing others. I found out about this concept only after being blindsided by my first episode of bipolar disorder during year one of medical school. The nearly fatal experience was thoroughly disorienting; my pain became the only part of myself not in constant flux. In this project, I used creative expression to embrace my wounds and recover both my personal and professional identities.

Methods: I built a narrative from text and graphics highlighting some of the important insights from my experience. First I searched my sketchbook and earlier textual drafts for recurring themes, and organized them in a way that others who do not know me could appreciate. Then I developed illustrations by: (1) using ink on paper to create a black and white image; (2) taking photos of these images and transferring them to Adobe Photoshop CS6; (3) digitally painting the illustrations with a Wacom 5 tablet; and (4) arranging the text and illustrations into a digital file for easy sharing.

Results: The work presented here, "Essence to Essence", is a short narrative with illustrations. The story features my mental deterioration, and how a suffering patient helped me rediscover my own path toward wellness. All events in the story are true and unexaggerated.

Conclusions: Embracing my wounds has allowed me to reach a new personal normal and develop my professional abilities as a future physician. My hope is that sharing this piece can popularize the idea of a "wounded healer," and can encourage others to find their own method for learning therapeutic lessons from their scars.

Giselle Zornberg, MS2 Mentor: Jonathan Golub, PhD

Poster Presenter, Medical Humanities/Bioethics

"Exchanging Realities": Impact of a Diverse Learning Environment on Brazilian Participants of a Tuberculosis Research Development Course

Background: The Johns Hopkins Center for Tuberculosis Research responded to the need for innovative solutions to the global tuberculosis epidemic by creating a training program for Brazilian tuberculosis researchers. Since 2006, this course has trained 79 Brazilian researchers of diverse academic backgrounds in Baltimore. This program has previously been evaluated in terms of student publications, without further exploration of the program's personal and professional impact. This study sought to understand the influence of this course on its Brazilian participants, focusing on the interdisciplinary and multicultural elements of the experience.

Methods: In this study, 18 semi-structured interviews with past participants were conducted and transcribed in Portuguese. The interview guide was developed using input from a focus group of eight 2013 participants. Participants came from six cities in Brazil, represented every year of the program from 2006 to 2012, and had diverse academic backgrounds including medicine, nursing, public health, and basic science. All transcripts were read and analyzed. A second investigator independently read a subset of transcripts to address potential bias. Themes were generated from analysis, with support from the Atlas.ti software.

Results: The following four dominant themes emerged: Participants felt that the program (1) promoted opportunities for "exchanging realities" and personal growth through its academically and culturally diverse environment, (2) improved their understanding and approach to solving the global problem of tuberculosis, (3) indirectly influences tuberculosis control in Brazil, and (4) would have a greater impact if better contact between peers and with Johns Hopkins was maintained after returning to Brazil.

Conclusions: This study suggests that by training individuals of various academic and cultural perspectives together, the Johns Hopkins Tuberculosis Training Program is developing researchers with a comprehensive view of the multifaceted barriers surrounding tuberculosis. This study contributes to the limited literature examining the influence of interdisciplinary and multicultural environments in educating health professionals.

PUBLIC HEALTH and COMMUNITY SERVICE

POSTER ABSTRACTS

Listed Alphabetically

Nancy Abu-Bonsrah, MS2 Mentor: Fizan Abdullah, MD PhD

Poster Presenter, Public Health and Community Service

Assessing The Nature Of Global General Surgical Education

Background: Surgical care is gaining recognition as an essential component of healthcare worldwide. However, the training of the global surgical workforce has received less attention and is anecdotally noted to be variable. Hence, a systematic literature review was undertaken to assess global trends in general surgery training.

Methods: PubMed, EMBASE, and the WHO Global Health Library were queried for articles on surgical education in different countries, from 1998 to 2013. Two independent reviewers evaluated citations and abstracts from all three databases and analyzed articles with detailed descriptions of a current national general surgery training system. The following data was extracted from each article: years of training required; years after medical school when general surgery training begins; national surgical oversight organization(s) and in-country opportunities for subspecialty training.

Results: The literature search resulted in 3,888 PubMed citations, 971 from Embase, and 726 from the Global Health Library. Duplicate articles were removed and 5,229 abstracts were ultimately reviewed for relevance. These were narrowed down to 228 (4.4%) earmarked for full text review. In total, data from 60 articles (1.1%) were used, resulting in information on 69 countries. The data revealed that residents spent an average of 2.1±1.1 years after medical school in preliminary study before embarking on surgical training, which lasted another 4.7±1.4 years. Oral and written exams were variably administered to residents before, during and after the training by country-specific oversight organizations, except the 17 African countries under the West African College of Surgeons. Most countries, excluding Eritrea, Guyana, Iceland and Malawi, had in country opportunities for sub-specialization.

Conclusions: Overall, significant differences do exist in general surgical training worldwide. In the wake of recent reforms in residency programs, this may be an ideal time to reexamine the structure of residency programs in light of a new global health paradigm.

Breanne Britton, MS2 Mentor: Adil Haider, MD

Poster Presenter, Public Health and Community Service

Are Surgeons Aware of Racial Disparities in Surgical Care and Outcomes?

Background: Racial health care disparities have been identified and documented in surgical care and outcomes in the United States. Despite extensive research revealing the prevalence of racial health care disparities in the field of surgery, it is thought that surgeon awareness of racial disparities is low. The purpose of our study was to assess active U.S. surgeons' awareness and perceptions of racial disparities in surgical care and outcomes.

Methods: We conducted an internet-based survey of 500 U.S. general surgeons on the American College of Surgeons mailing list in which surgeons reported on whether or not they were aware of health care disparities in surgical care and outcomes, their opinions on the causes of these disparities, and potential solutions for eliminating disparities.

Results: Data is still being collected. The current response rate is 20%. The majority of respondents are male (66%), white (79%), and practice in an urban setting (62%). Preliminary data analysis shows that although 39% of surgeons rated the evidence for the existence of racial disparities in surgical care as "very strong" or "somewhat strong," 86% reported that it is "very unlikely" or "somewhat unlikely" that disparities exist in their hospital or clinic, and 91% reported that it is "very unlikely" or "somewhat unlikely" that disparities exist in their own practice. 63% of respondents reported that blacks with medical conditions are just as likely as whites who have similar medical conditions to be evaluated for surgery. Additionally, 48% of respondents reported that there are fewer disparities in surgical care than other areas of health care.

Conclusions: As data is still being collected, conclusions cannot be made at this time. Limitations of this study include time, low response rate, and possible response bias. Those who responded to the survey may have been more informed about racial disparities, which would overestimate the rate of awareness.

Bryn Carroll, MS2 Mentor: Jonathan Golub, PhD MPH

Poster Presenter, Public Health and Community Service

A Prevalence Survey of TB Among DM Patients in South Africa

Background: While low-and-middle-income countries continue to face a high burden of infectious diseases such as tuberculosis (TB), they now also face a growing burden of non-communicable diseases such as diabetes mellitus (DM). Current research suggests that DM increases one's susceptibility to TB infection and predicts worse treatment outcomes. This study aimed to determine the prevalence of TB among adults with diabetes in South Africa, a newly-industrialized country (NIC) with a historically high burden of TB, where the co-occurrence of these diseases has not previously been investigated.

Methods: A retrospective chart review was conducted in the adult diabetes clinic at Chris Hani Baragwanath (Bara) Hospital in Soweto, a township of Johannesburg, South Africa. Data pertaining to demographics, diabetes management, TB history, and comorbid conditions were recorded.

Results: The study population (n=452) was 65% female and had a mean age of 59.3 ± 10.1 years. 97% had Type II DM with a median year of onset in 2001 (range: 1972-2011). 95% required insulin for diabetes management. Four subjects (0.88%) had a prior diagnosis of TB. Two cases were classified as pulmonary, one as extra-pulmonary, and one was unspecified. No information about drug resistance was available.

Conclusions: Since data analysis is ongoing, no conclusions can be made presently. One limitation of this study is that, due to the way in which patient information is recorded and stored at Bara, information from diabetes clinic visits only was available for this chart review. Therefore, it is possible that the final estimation of TB prevalence may underestimate the true prevalence if the endocrinologist did not record TB infection in a patient's diabetes clinic note.

Lisa Chen, MS2 Mentor: Neil Bressler, MD

Poster Presenter, Public Health and Community Service

Reading Functions in One Eye versus Both Eyes Open in Neovascular Age-related Macular Degeneration and Their Associations with Patient-reported Vision Related Function Using NEI VFQ-25

Background: Purpose: To compare reading in the "better- or faster-reading" eye compared with "both eyes" open among patients with neovascular age-related macular degeneration (AMD).

Design: Prospective.

Methods: A convenient cohort being managed for neovascular AMD in at least one eye were enrolled if they had visual acuity of 20/200 or better in at least one eye. ETDRS visual acuity (VA), reading acuity (RA), and maximum reading speed (MRS) test by MNRead chart, and reading speed test with large type reading charts (LTRC) were measured with each eye alone and then with both eyes. Definitions: the "better-reading" eye read ≥0.2 logMAR than the other eye if either eye read ≥0.7 logMAR or read ≥0.1 logMAR than the other eye if both eyes read ≤0.6 logMAR; a "faster-reading" eye read ≥15 WPM more than the other eye. Vision-related function was measured using the National Eye Institute Vision Function Questionnair-25 (NEI VFQ-25). Associations were assessed using Pearson correlation.

Results: Among 41 neovascular AMD patients (82 eyes), mean age was 80±10 years; 68% were women. Both eyes open showed better RA than the "better-reading eye" in 22% (95% confidence intervals [CI]: 9%-40%), and worse RA in 22% (95% CI: 9%-40%). When using LTRC, both eyes open read faster than the "faster-reading eye" in 13% (95% CI: 4-27%), and slower in 23% (95% CI: 11-39%). The correlation of the NEI VFQ-25 near activity subscale score with RA with both eyes open was -0.568 (95% CI: -0.745, -0.315) (P<0.001), -0.610 (95% CI: -0.793, -0.326) (P<0.001) with the "better-reading" eye, and 0.559 (95% CI: 0.092, 0.632) (P = 0.001) with the "faster-reading" eye MRS.

Conclusions: Reading acuity and maximum reading speed measured using only the "better- or faster-reading" eye appears to be better compared with both eyes open in some patients with neovascular AMD, but worse in others.

Zachary Enumah, MS1 Mentors: Gretchen Berland, MD, Dr. Christopher Orach

Poster Presenter, Public Health and Community Service

Does Knowing One's Right to Health Facilitate Higher Demand for Access to Essential Medicines? An Examination of Community Empowerment in Gulu District, Uganda

Background: Uganda is a pioneer in its legislation regarding the right to health. Internationally, the human rights approach to health has been slow to materialize in a way that is actionable and accountable, where a citizen can actually appeal to his or her government in the case of violation of the right to health.

Methods: In the first part of the study, a ten-question survey was presented to participants (N=50). First, demographic information was obtained in order to better analyze respondent choices along the axes of gender, level of education, health status, social status, voting capacity, and material wealth. Respondent attitudes towards the government's responsibility to provide healthcare services were elicited using a five-point Likert scale. A series of ten statements regarding ten different provisions included within the right to health were read (e.g. "the government of Uganda is responsible for providing antimalarial medication to children"). In the second part of the interview, participants were given five scenarios that in some way demonstrated the right to health being denied. After each scenario, the respondent was asked, "What could you do to prevent instances like this happening in the future?"

Results: Overall levels of agreement indicate high levels of awareness of individual's right to health—we suggest this is due to Uganda's emphasis on health education campaigns especially in the wake of the HIV/AIDS epidemic. Generally, most respondents indicates a high level of awareness of their right to health, but this awareness did not correspond to empowerment along the axes of accessing information, holding authorities accountable, directly participating in making demands, and organizing with other community members.

Conclusions: This study suggests that community awareness of the right to health does not necessarily correlate with high levels of empowerment.

Antony Kironji, MS2 Mentor: Adil Haider, MD MPH FACS

Poster Presenter, Public Health and Community Service

Using the Delphi Method to Identify Best Practices for Analyzing Trauma Using Large Trauma Registries

Background: Over the past two decade there has been an explosion of research deriving from trauma databases. The National Trauma Data Bank (NTDB) is the largest Trauma databases, which now comprises of more than 95% of all Level I trauma center in the U.S.1 In addition to NTDB there are other large trauma registries that compile state, regional and national data. These databanks have become very important data source for quality improvement, injury prevention, pre and post hospital care, resource allocation and more2a. To date there are no guidelines on how data from these trauma registries should be used or analyzed1. This is problematic according Haider et al2. In a review of publications written on the use of NTDB, Haider et al state that investigators use of different methodologies and variables "to perform risk-adjusted analyses" 2 on the data affects the quality of studies generated. Furthermore this lack of standardization and consensus on best practices limits the interpretability and external validity of scientific findings generated using NTDB2. In addition to a lack of standardization of the analyses, Haider et al notes that there is variability in how investigators choose to address limitation posed by missing data points in the NTDB2. This also limits the interpretability of scientific findings generated.

Methods: The case based Delphi method will be used to survey experts within the trauma community to generate consensus on best practices while using large trauma registries. Experts will be recruited using a set criterion. They will be surveyed with regards to outcome measures, statistical methods and overcoming limitations of trauma registries. Elements that reach consensus after two rounds of survey will be published as a guideline to trauma registry research.

Results: Results pending.

Conclusions: Results pending.

David Li, MS2 Mentor: David Celentano, ScD MHS

Poster Presenter, Public Health and Community Service

Sexual orientation and alcohol use among adolescents and young adults in Thailand

Background: Among Thai adolescents, prevalence of current alcohol use ranges from 12.17 to 25.5% for boys and 13 to 14.5% for girls, depending on the age group studied. At particularly high risk for substance use are sexual minority adolescents, who report earlier ages of initiation and increased consumption compared to their heterosexual peers. However, alcohol use among sexual minority adolescents in Thailand remains poorly studied, particularly in the wake of recent alcohol control regulations that aim to severely limit alcohol sales and advertising towards adolescents. Thus, the present study seeks to characterize patterns and correlates of alcohol use among 1,222 Thai adolescents aged 14-24, comprised of 532 heterosexual, 53 sexual minority, and 637 non-sexually active participants.

Methods: Participants were categorized as non-drinkers, low-risk drinkers, and high-risk drinkers, based on Alcohol Use Disorders Identification Test (AUDIT) scores. Multinomial logistic regressions were performed, controlling for demographics, district of residence, and concurrent marijuana and yaba (methamphetamine) use.

Results: Our results show significantly increased risk of high-risk drinking among heterosexuals (odds ratio (OR) 8.30, 95% confidence interval (CI) 5.40-12.74) and sexual minorities (OR 15.77, 95% CI 5.27-47.18) compared to non-sexually active adolescents. High-risk drinking was also significantly increased among users of marijuana and yaba, and significantly decreased among females. Low-risk drinking was significantly increased among both heterosexuals (OR 2.39, 95% CI 1.64-3.49) and sexual minorities (OR 4.73, 95% CI 1.82-12.30) compared to non-sexually active adolescents, but was not associated with marijuana use, yaba use or gender.

Conclusions: Overall, our results suggest that among Thai adolescents, sexual minorities exhibit increased risk for both low- and high-risk drinking when compared to their heterosexual and non-sexually active peers, highlighting the importance of integrating sexual health and substance use programs in future interventions.

Juliana Macri, MS2 Mentor: Judy Mitchell, BSN RN

Poster Presenter, Public Health and Community Service

A Quality Improvement Project to Enhance Care Coordination and Referral Tracking in a Community Health Center Setting

Background: Coordinating care through referral tracking is essential to ensuring patient-centered primary care, yet these coordination tasks can easily become unmanageable in overburdened and under-resourced settings. This quality improvement project aimed to help a Community Health Center in southern Alabama coordinate patient care more efficiently and effectively. We identify gaps in care coordination that occur due to the current paper-based referral tracking process and recommend strategies to improve tracking using the EHR system and redesigned clinical workflow.

Methods: My study population was adult medicine patients whose PCPs requested referrals through the EHR system (n=325) over a 2 month period. I performed a detailed analysis of the portion of these (n=82) that were then appropriately entered into the paper-based referral tracking system. I identified all referrals that were tracked through to completion and analyzed how long it took for these referrals to get through each stage in the tracking process. Staff-reported concerns and suggestions and a literature review of best practices also contributed to my recommendations for improvement.

Results: A high proportion (74.8%) of requested referrals were never entered into the paper-based tracking system and therefore never followed up on. Of those referrals that made it into the paper-based tracking system, there were very inconsistent time frames for referral tracking and only 40.2% were followed up to completion. No-show rates for referral appointments were very high (48.8%). Patient care coordination suffers as a result and the cumbersome paper-based processes frustrate clinic staff.

Conclusions: The current referral tracking system makes it challenging to successfully coordinate patient care. An automated electronic referral tracking system would be more efficient and effective than a paper-based system. Specifically reassigning staff to care coordination tasks is also essential to fitting referral tracking into clinic workflow. The recommended improvements are feasible, even given the resource and staffing constraints at this clinic.

Dane Moran, MS2 Mentor: Shivam Gupta, MD

Poster Presenter, Public Health and Community Service

Injury patterns and Helmet Use among Motorized Two-Wheeler Road Users in Hyderabad, India

Background: India has the second largest number of deaths secondary to RTIs (road traffic injuries) in the world. Motorized two-wheeled vehicles (MTVs) are the most popular form of transport in India. The there is a national helmet law in India, but this law has not been notified in some states. The aims of this study are to characterize the extent of helmet use and the patterns of injury among drivers and passengers of MTVs in Hyderabad, India.

Methods: An observational study of helmet use and traffic flow was conducted in 6 different locations on 6 separate occasions during 5 different time slots. The number of drivers and passengers wearing and not wearing helmets were counted over 90 minute intervals to assess helmet use. The number of vehicles passing were counted over the period of 15 minutes and stratified by type of vehicle to measure traffic flow and composition. Retrospective data collection from patient records was performed on patients that presented to a large teaching hospital following a RTI. Data was collected from July 2011 to April 2013.

Results: 29.0% (N=709,970) of drivers and 0.4% (N=191,669) of passengers of MTV's were observed to be wearing helmets. MTV's accounted for 61.8% of the total traffic volume, 60.4% (N=993) of the RTI victims reporting to hospital, and 59.0% (N=174) of the RTI victims that died in hospital. Of the patients reporting to hospital following an RTI while travelling on an MTV, 54.2% had head injuries, 42.4% had lost consciousness, and 17.5% died in hospital.

Conclusions: MTV's are the dominant form of transport in Hyderabad, are implicated in the majority of road traffic crashes, and cause the highest amount of death on the roads. Introduction of increased enforcement surrounding helmet use would likely be effective in decreasing the burden of disease due to RTI's in Hyderabad.

Steven Pennybaker, MS2 Mentor: Matthew Johnson, PhD

Poster Presenter, Public Health and Community Service

The effect of long-term amphetamine treatment for ADHD on impulsivity, delayed-discounting, and sexual discounting as assessed using the crowdsourcing platform Mechanical Turk.

Background: While stimulant medications are growing in usage, very little research has been done looking at the long-term chronic effects of their prescription on cognition. With a growing body of literature observing dopaminergic defects in methamphetamine addicts, the purpose of this study is to determine if there are detectable behavioral differences in those prescribed stimulants long-term. One of the major measurable cognitive deficits associated with amphetamine abuse are changes in delay discounting and reward anticipation.

Methods: The Amazon Mechanical Turk system was used to survey 319 participants: 97 previously prescribed amphetamines (AMP), 89 previously prescribed methylphenidate (MPH), 58 never-medicated participants who scored as ADHD on an ADHD Self-Report Scale, and 75 non-ADHD controls. The participants had an average age of 31, the majority had post-secondary education, and there were a higher number of males than females in the medicated groups. Participants were matched for age, education, income, gender, and smoking-status in the final analysis. Participants filled out an ADHD Self-Report Scale, Kirby Delayed Discounting Questionnaire, Barratt Impulsiveness Scale, Sexual Delayed Discounting Questionnaire and gave demographic and prescription drug use history.

Results: Data is currently being analyzed. We hope to determine if the matched AMP group has differences in delay discounting, sexual delay discounting, or impulsivity compared to MPH medicated and control groups, as measured by the surveys the participants completed.

Conclusions: Data not yet analyzed. However, regardless of results, our study does have some limitations. While we will be matching past-medicated participants in two different medication classes with ADHD controls, it is not possible to prove causation with our current study design. Another major limitation is that very few people in the ADHD non-medicated group were diagnosed with ADHD formally, and may have less severe symptoms. This discrepancy could complicate measuring of impulsivity and delay discounting.

Joshua Posen, MS2 Mentor: Gerard Anderson, PhD

Poster Presenter, Public Health and Community Service

What factors define a successful Accountable Care Organization and may be applied to the Health Links program in Ontario, Canada?

A review of the literature from Key Opinion Leaders.

Background: The Accountable Care Organization (ACO), considered the latest iteration of managed healthcare in the U.S., was established as a delivery system option for Medicare by the PPACA (Affordable Care Act) of 2010. More than 300 ACOs have since contracted with the Centers for Medicare and Medicaid Services (CMS) to cover more than 4 million Medicare beneficiaries. ACO stakeholders and health policy researchers have attempted to define the ACO, but there has been limited consensus, particularly on identifying the factors common to successful ACOs. The purpose of this review is to identify and describe factors common to successful ACOs, which may be applied to analogous healthcare programs abroad, such as the Health Links program in Ontario, Canada.

Methods: EMBASE, CINAHL PLUS, PubMed and the archives of Health Affairs were searched using the terms "Accountable Care Organization" and "ACO". The titles of the first 100 hits in each database were screened for relevancy; abstracts of 38 relevant articles were then read for clarity of argument and soundness of evidence, and 9 articles were selected for inclusion in this review. Key and common factors of successful ACOs were identified in the articles, then organized and summarized.

Results: The 8 key and common factors identified and organized were, "local accountability", "effective transition to shared risk", "best practice professional skills development in collaboration, communication and teamwork", "establishment of annual spending benchmarks based on historical trends and adjusted for patient mix", "real-time healthcare performance data sharing", "strong payer-provider relationship", "effective patient attribution", and "healthcare provider leadership". The first 3 of these factors were identified as most important and most transferable to Ontario's Health Links program, and were summarized.

Conclusions: Local Accountability, effective transition to shared risk, and best practice professional skills development are three factors common to successful ACOs and could serve as foundations for analogous healthcare programs abroad.

Sarah Saleemi, MS2 Mentor: Robert Gilman, MD

Poster Presenter, Basic Science

Histological changes in the rat model of Neurocysticercosis suggest demyelination

Background: Neurocysticercosis (NCC) is the leading cause of epilepsy in South America and is steadily increasing in prevalence in the United States. Despite this, neither the pathogenesis of seizures nor reliable markers for seizure susceptibility in patients with NCC have been identified. The recent development of a rat model of neurocysticercosis has allowed more intensive research into its clinical course. A previously undescribed histological change consisting of spongiotic "holes" in the vicinity of NCC cysts has been consistently observed in infected rat brains. A visually similar process has been observed in other models, however, the pathogenesis has not been investigated. The current study attempts to discern the mechanism of this histological change.

Methods: Infected and non-infected rats were necropsied 3 months post infection. Sections of cortical tissue with thicknesses of 8, 10 and 12 *µm were paraffin mounted and subjected to* immune and histochemical stains to characterize changes in parenchyma in reaction to cysts. Stains utilized included anti-glial fibrillary acidic protein (GFAP) antibodies (an astrocyte marker), Luxol Acid-Fast Blue (myelin stain), and Masson Trichrome for connective tissue.

Results: Staining and light microscopy revealed astroglial proliferation and breakdown of the blood brain barrier. Areas of spongiosis were composed of neither collagen, nor fat , and occurred primarily in areas of white matter. Myelin staining revealed demyelination in the parenchyma of infected brains. A similarity of cytokine profiles reported in the literature between inflammatory neurocysticercosis and multiple sclerosis was also observed. This evidence suggests that there is likely a demyelinating process occurring in neurocysticercosis in the rat model.

Conclusions: Demyelination presents one possible explanation for previously unexplained clinical and radiological features of neurocysticercosis found in humans. This suggests that the same process may occur in humans where it would have significant clinical implications as both a marker for seizure susceptibility and target for future treatments.

Andrew White, MS2 Mentor: Sarah Polk, MD

Poster Presenter, Public Health and Community Service

Application of the WHO Child Growth Standards: Measuring the Double Burden of Malnutrition in Ecuador

Background: Report nutritional status in children 0-5 years of age for El Centro Rotario, a non-profit clinic, in the rural Andes.

Methods: Anthropometric data were collected as part of a cross-sectional convenience sampling from regular clinic visits and ferias de salud.

Using the "Nutritional Survey" mode of the WHO Anthro Calculator, Z-Scores were calculated to determine the current prevalence of malnutrition within the community.

Results: In all, 737 (376 f: 357m) children were included in this observational study; as a population, stunting (Height [<2.14% percentile]-for-Age) and risk of overweight (BMI [>84.1%]-for-Age) were the most notable forms of malnutrition, present in 21.3% and 30.1% of children, respectively, both significantly deviating from the "ideal" WHO curves [$p<0.05$; $p<0.5$].

Conclusions: Stunting in any pediatric population can cause long term developmental consequences; when present in 1 of every 5 children in a community, there is unquestionable impetus to pursue careful micronutrient monitoring in those with impaired growth. Moreover, "overnutrition" at such young ages will only increase necessity for prevention of chronic diseases later on in life.

This unique growth profile suggests the need for future studies to shed light on the nutritional determinants contributing to what can only be described as a "double burden of malnutrition," and more importantly, what can be done to lessen this burden.

Limitations of the study are founded in a lack of longitudinal follow-up. Furthermore, application of any "standardized" growth curve should be used with caution, not only in resource poor settings, but whenever providers attend to populations different from those used to draw them.

Nonetheless, this study is a testament to the feasibility and simplicity through which point-of-contact nutritional status surveillance systems can be used to identify acute malnutrition, in addition to the future priorities of interventions that aim to curb it.