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Welcome to Faculty Research Day 2019. This program was initiated in 1982 to celebrate faculty research at the University of Kansas Medical Center (KUMC) and recognize the excellent work of the KUMC research community. This day provides KUMC scientists an opportunity to share their research work with other faculty and for all faculty to hear about the innovative research conducted at the medical center.

We take special pride in identifying those individuals who deserve special recognition for their research and contributions to research administration. Individuals from the schools of Health Professions, Medicine and Nursing may be recognized in one of three categories:

The **Chancellors Club Research Award** is reserved for those KUMC faculty who are recognized leaders and who have achieved national and international stature in their chosen fields of research. Nominations are sent to the Vice Chancellor for Research Administration, a committee is selected to review the nominations and the final recommendation forwarded by the Vice Chancellor for Research to the Kansas University Endowment Association.

Individuals receiving an **Faculty Investigator Research Award** are nominated by the KUMC faculty at large. Nominations are ranked by each schools' research committee and then reviewed by Faculty Assembly Research Committee with recommendations to the Associate Vice Chancellor for Research Administration.

**Noffsinger Investigator Award** is awarded to the individual who received the highest ranking in their application to the Lied Endowed Basic Science Program through the KUMC Research Institute. The mission of the Lied Basic Science Grant program is to develop new and innovative ideas that have a high probability of leading to the submission of a new application for national peer-reviewed funding.
The **Research Administrator Award** recognizes and honors significant administrative support of the research enterprise at the KUMC Kansas City and Wichita campuses. Nominations are ranked by the division directors of the KUMC Research Institute with recommendations to the Associate Vice Chancellor for Research Administration.

We thank you for your continued support.

2019-2020 Faculty Assembly Research Committee
Karen Wambach, PhD, RN, FLICA FAAN, Chair; Holly Hull, PhD, Co-Chair; Indranil Biswas, PhD; Samuel Ofei-Dodoo, PhD, MPA; Heather Nelson-Brantley, PhD, RN; Mindy Bridges, PhD; Hinrich Staecker, MD, PhD; Kelly Robertson

2018-2019 Faculty Assembly Research Committee
Allen Greiner, MD, Chair; Karen Wambach, PhD, RN, IBCLC, Co-Chair; Evan Dean, PhD, OTR/L; Samuel Ofei-Dodoo, PhD, MPA; Danielle Olds, PhD, MSN, RN; Paige Geiger, PhD; WenFang Wang, PhD; Kelly Robertson
KUMC Faculty Research Day Program
5202 Health Education Building, Ad Astra Room

11:00 AM  **Faculty Poster Session**

12:00 PM  **Welcome and Opening Remarks**
Jamie Caldwell, MBA
Associate Vice Chancellor for Research Administration, KUMC
Executive Director  KUMC Research Institute

Karen Wambach, PhD, RN, FICLCA, FAAN
Professor, Chancellor’s Club Teaching Professor
Director, PhD Program and Co-coordinator, BSN Honors Program
University of Kansas School of Nursing
Chair, Faculty Assembly Research Committee

12:15 PM  **Keynote Address**
Introduced by: Karen Wambach, PhD, RN, FICLCA, FAAN

**Intrahepatic ketone shuttles and NASH-like pathogenesis**

*Peter Crawford MD, PhD*
Professor of Medicine, Division of Molecular Medicine
University of Minnesota

1:00 PM  **Dietary Neuroketotherapeutics for Alzheimer’s Disease**
Debra Sullivan, PhD, RD, Dietetics and Nutrition
Russell Swerdlow, PhD, Neurology

1:20 PM  Discussion

1:30 PM  **Heart Failure with Preserved Ejection Fraction (HFpEF): Potential Treatments**
Qiuhua Shen, PhD, APRN, RN
School of Nursing

1:50 PM  Discussion
KUMC Faculty Research Day Program

2:00 PM  **Special Honors**

**Chancellors Club Research Awards**
*Bruno Hagenbuch, PhD (School of Medicine)*
*Hartmut Jaeschke, PhD*

**Thomas L. Noffsinger Investigator Awards**
*John A. Taylor, III, MD, MS (School of Medicine)*
*Jeffrey Holzbeierlein, MD, FACS*

**Faculty Investigator Research Awards**
*Jeffrey M. Burns, MD, MPH (School of Medicine)*
*Russell Swerdlow, PhD*
*Jill Peltzer, PhD, APRN-CNS (School of Nursing)*
*Danielle Olds, MPH, PhD, RN, CIC*
*Catherine Siengsukon, PhD (School of Health Professions)*
*Sandra Billinger, PT, PhD, FAHA*

**Research Administrator Awards**
*Hollie Boyd (School of Nursing)*
*Karen Wambach, PhD, RN, FILCA, FAAN*

2:15 PM  **Using a Ketogenic Diet to Improve Diabetes-Induced Neuropathy and Pain**
Doug Wright, PhD
Anatomy and Cell Biology

2:35 PM  Discussion

2:45 PM  **KUMC Success in Research Funding**
Jamie Caldwell, MBA

3:00 PM  **Closing Remarks**
Karen Wambach, PhD, RN, FILCA, FAAN

**Reception to follow**
Jamie Caldwell, MBA
Jamie Caldwell, M.B.A., associate vice chancellor for research administration for the University of Kansas Medical Center and executive director of University of Kansas Medical Center Research Institute, Inc., Interim Executive Director and President, University of Kansas Center for Technology and Commercialization. Caldwell has worked for more than 35 years in leadership roles in research administration. Jamie has served in his current role since January of 2015. Prior to that he served as director of the Office of Research Services for the Health Sciences at Loyola University in Chicago, where he led and strengthened a research and sponsored projects enterprise similar to KU Medical Center’s Research Institute.

Peter Crawford, MD, PhD,
Obesity and cardiovascular disease are among the leading causes of morbidity and mortality worldwide. Our research focuses on the interplay between intermediary metabolism and these disease processes. Derangements in the processing of carbohydrates, fats, and amino acids are central drivers of disease pathogenesis, but the roles of another metabolic fuel class, ketone bodies, are less well understood. We use novel genetic mouse models with engineered deficiencies in ketone body metabolism to study the metabolic shifts that occur in response to obesity, cardiovascular disease, and dynamic environmental challenges. From these models, we have developed new perspectives of how metabolism adapts in obesity, diabetes, nonalcoholic fatty liver disease (NAFLD/NASH), and cardiomyopathy; how these adaptations ultimately prove deleterious, and how innovative and personalized nutritional and pharmacological therapies may mitigate these adverse responses.

We leverage recent advances in stable isotope tracer based NMR and mass spectrometry-based untargeted metabolomics technologies to study metabolism on a systems level, and we also employ established techniques in molecular cell biology and biochemistry to reveal phenotypic shifts at the cellular level. Complex in vivo phenotyping methodologies are strategically aligned with these sophisticated chemical profiling platforms to generate high resolution phenotypic pictures. In addition to our mouse studies, we perform studies in humans to learn how alterations of ketone metabolism and related pathways may serve as diagnostic biomarkers and therapeutic targets for obesity, diabetes, NAFLD/NASH, heart failure/CHF, and metabolic maladaptations that can occur in any disease state.
Qiuhua Shen, PhD, APRN
Dr. Shen is an Assistant Professor in the School of Nursing at the University of Kansas Medical Center. Her program of research focuses on mechanisms of oxidative stress and mitochondrial bioenergetics, and interventions to reduce symptoms and improve health outcomes of patients, especially those with heart failure with preserved ejection fraction (HFpEF). She is also interested in examining genomics to promote precision health.

Debra Sullivan, PhD, RD
Debra Sullivan, PhD, RD is the Midwest Dairy Council Endowed Professor in Clinical Nutrition. Her research focuses on how diet influences chronic health conditions. Her early research focused on prevention and treatment of obesity. She has now expanded her research to explore how diet influences the aging brain.

Russell Swerdlow, PhD
Dr. Swerdlow is a professor in the Department of Neurology. He holds the Gene and Marge Sweeney Chair and directs the University of Kansas Alzheimer’s Disease Center. His research focuses on the role brain energy metabolism plays in Alzheimer’s and other neurodegenerative diseases, and how to manipulate brain energy metabolism.

Doug Wright, PhD
Doug Wright, PhD is a neurobiologist that studies conditions that affect peripheral nerves. His laboratory uses mouse genetic models to explore the pathogenesis of nerve dysfunction and pain, as well as testing interventions via translational research in human patients suffering from peripheral nerve disease and pain.

Karen Wambach, PhD, RN, FRLCA, FAAN
Dr Karen Wambach is Professor in the School of Nursing. She is a Chancellor’s Club Teaching Professor, PhD program director, and co-coordinator of the Nursing Undergraduate Honors Program. Dr Wambach’s research program focuses on breastfeeding promotion and support especially among vulnerable populations such as adolescent mothers. She and her inter-professional team are funded by the National Institute of Child Health and Development for a pilot test of an education and support multi-behavioral intervention for pregnant and parenting adolescent mothers.
Chancellors Club Research Award

2019
Bruno Hagenbuch, PhD
Department of Pharmacology, Toxicology and Therapeutics

Thomas L. Noffsinger Investigator Award

2019
John A. Taylor, III, MD, MS
Urology Surgery

Faculty Investigator Research Award

2019
Catherine Siengsukon, PT, PhD, School of Health Professions
Jeffrey Burns, MD, MPH, School of Medicine
Jill Peltzer, PhD, APRN-CNS, School of Nursing

Research Administrator Award

2019
Hollie Boyd, Office of Grant Research (OGR), School of Nursing
1  **Auditory Comprehension and Repetition in Persons with Aphasia**  
Susan T. Jackson¹; Amanda Platt²; Shaina Stasi³  
¹School of Health Professions, Department of Hearing and Speech; ²School of Health Professions, Department of Hearing and Speech; ³School of Health Professions, Department of Hearing and Speech  

**Background:** Models of short-term memory indicate evidence of a possible connection between repetition skills and auditory comprehension. Despite this theoretical framework, little research has been conducted investigating the relation between repetition abilities and auditory comprehension in persons with aphasia (PWAs). Impairment in either or both of these areas is often seen in PWAs. The current retrospective study examines whether repetition span and/or sentence repetition ability are related to auditory comprehension of sentences in PWAs.

**Methods:** Auditory comprehension and repetition skills of 110 PWAs were examined using scores from the AphasiaBank database. Scores on the Yes/No Questions and Sequential Commands subtests of the Western Aphasia Battery – Revised were examined to determine auditory comprehension skills of the PWAs. These scores were then compared to repetition span and sentence repetition skills, which were determined using four sub-scores on the AphasiaBank Repetition Task. There were two sentence repetition tasks: repeat sentences of increasing length, and sentences of approximately the same length but varying linguistic complexity. The span task yielded two scores (serial order and any order correct).

**Results:** There was a significant positive correlation between repetition scores and auditory comprehension of yes/no questions ($r = .381-.416$). There was a slightly stronger significant positive correlation between repetition scores and auditory comprehension of sequential commands ($r = .450-.529$). All correlations were significant at the 0.01 level.

**Conclusion:** Given the significant correlation between auditory comprehension and repetition skills in PWAs, clinicians might be able to use models of short-term memory that link these two processes when considering intervention approaches for PWAs.

2  **NDNQI®: Using Big Data to Advance the Science of Interprofessional Teams**  
Nancy Dunton, PhD, FAAN* and Teri Kennedy, PhD, MSW, LCSW, ACSW, FGSA, FNAP**  
*School of Nursing/Department of Health Policy and Management  
**School of Nursing, The University of Kansas Medical Center
Background. Interprofessional practice and education is viewed as the holy grail to achieve the Quadruple Aim in healthcare: improved patient, population, price, and practitioner outcomes. A 2014 scoping review found that research had not yet demonstrated the impact of IPE, citing the need for systematic research to strengthen the evidence base for interprofessional team-based care.

Methods. The National Database of Nursing Quality Indicators (NDNQI) ® Survey, completed by 240,000 RNs in 2018, includes interprofessional relationship measures between RNs and physicians, APRNs, pharmacists, therapists, and social workers. RNs rated relationships on conflict management skills; respect; assignment of blame for adverse events; shared accountability; and understanding roles, knowledge, and skills of RNs.

Results. Among the dimensions of interprofessional relationships, RNs rated “respect for the contributions of RNs” most highly and gave the lowest rating to “colleagues understand the roles, knowledge and skill of RNs.” RNs rated their relationships with social workers more highly than with other professions. Ratings were lowest for physicians. Ratings interprofessional relationships were highest on Ambulatory care units and lowest on perioperative units.

Conclusions. These results highlight areas for improvement in interprofessional healthcare and demonstrate the promise of big data to advance the science of interprofessional teams in healthcare.

3 Advancing Team Science Principles through Interprofessional Team-Based Education
Sarah Shrader, PharmD, BCPS1; Teri Kennedy, PhD, MSW, LCSW, ACSW, FGSA, FNAP2
1School of Pharmacy/The University of Kansas, Lawrence, KS; 2School of Nursing/KUMC

Background: Interprofessional team-based care addresses the needs of complex patients and connects with the Quadruple Aim in healthcare for improved patient, population, price, and practitioner outcomes. Safety-net clinics serve high-need patients experiencing health disparities who benefit from coordinated team-based care.

Methods: The University of Kansas Medical Center developed an academic/community partnership between health professions educators and safety-net clinics serving patients in Kansas City and Leavenworth, Kansas. Interprofessional practitioners at these sites were provided with two educational interventions that employed team science principles spanning over 9-months.
**Results:** Pre- and post-survey data was collected using the Assessment for Collaborative Environments (ACE-15), a rapid 15-item assessment tool measuring practitioners’ perceptions of interprofessional “teamness,” suitable for a range of health professionals and clinical sites. The tool was administered to healthcare team members at baseline and 9-months (n=28) later following the educational team science intervention. Means were compared using an unpaired t-test.

**Conclusion:** Practitioners exposed to team education had improved scores on all 15-items. Seven of the items reached statistically significant improvements in “teamness” (p-value < 0.01). The largest improvement was the item stating “all voices on the team are heard and valued.” This intervention demonstrates the potential of interprofessional team-based education to advance team science principles.

4 Effects of Oxaloacetate Treatments on Cerebral Antioxidant and Neurochemical Profile in Patients with Alzheimer’s Disease Using In Vivo Metabolic Neuroimaging

In-Young Choi, PhD1, Phil Lee, PhD1, Eric Vidoni, PhD1, Jonathan Clutton1, Annette Becker1, Erica Sherry1, Rebecca Bothwell1, Heidi Anderson1, Jonathan D Mahnken, PhD1, Heather M. Wilkins, PhD1, William Brooks, PhD1, Gregory Reed, PhD1, Jeffrey M. Burns, MD1, and Russell H. Swerdlow, MD1 (1) University of Kansas Alzheimer’s disease Center, Kansas City, KS, USA

**Background:** Mitochondrial abnormalities and metabolic dysfunction in AD have been noted and thought to be closely related to neurodegeneration. Thus, mitochondrial biogenesis may be an important strategy to enhance the bioenergetics of AD brains. We propose that treatments of oxaloacetate (OAA), an intermediate metabolite of the tricarboxylic acid (TCA) cycle, could mediate mitochondrial biogenesis to improve respiratory flux and overall bioenergetics. The effect of OAA treatment (2 g/day) on an array of neurochemicals that are linked to brain energetics, including glutathione, glutamate, lactate and N-acetylaspartate (NAA), in AD participants was measured using advanced magnetic resonance spectroscopy (MRS) techniques.

**Methods:** Neurochemical concentrations of AD participants were measured from fronto-parietal regions using MRS before (baseline) and following one-month oral OAA supplementation at a daily dose of 2 g (n=15). Advanced MRS techniques include: Short echo-time single voxel MRS (semi-LASER sequence, TR/TE=2000/35 ms, voxel size 30x25x20 mm³ located at the left parietal regions) for measurements of NAA, total choline (tCho), creatine (Cr), myo-inositol (mI), and glutamate+glutamine (Glx); Long echo-time (TE=144 ms) semi-LASER MRS for lactate (Lac); TE-averaged MRS for glutamate (Glu); and multiple quantum filtered chemical shift imaging (CSI)
technique for brain GSH. Neurochemical concentrations were quantified using the linear combination of model spectra (LCModel) analysis method except GSH, which were processed using a quantification method developed in-house. All neurochemical concentrations were compared before and after the OAA treatment using the two-tailed paired T-Test.

Results: Positioning of the MRS voxel and CSI slab was consistent at baseline and follow-up scans as evidenced by tissue compositions of the voxels. We observed significant increases in brain GSH concentrations following one month of OAA treatments. Increases of GSH were significant in the frontal and front-parietal regions (p=0.03 and 0.04, respectively) and were most pronounced in the parietal region (13%). There were no measurable differences in other neurochemicals.

Conclusions: This study demonstrates the potential of enhancing mitochondrial biogenesis via mitochondrial medicine. As lower GSH contents lead to mitochondrial damage and are associated with lower cell viability and increased apoptosis, OAA treatments resulting in significant increases in brain GSH could offer new opportunities for AD treatment and management.

5 Association between brain glutathione levels, cognitive function and dairy intake in aging and Alzheimer’s disease
In-Young Choi1,2,3; Jeffrey Burns2, Debra K Sullivan4; Phil Lee1,3
1Hoglund Brain Imaging Center, 2Neurology, 3Molecular & Integrative Physiology, 4Dietetics and Nutrition, Univ. of Kansas Medical Center, Kansas City, KS 66160

Background: Improving the cerebral antioxidant capacity is considered an important strategy in protecting cells against oxidative stress, which is one of the primary causes of aging and Alzheimer’s disease (AD). Inadequate diet is commonly observed in older adults with poor physical and/or cognitive function. Beneficial effects of adequate dietary choices have been noted in promoting healthy brain aging and protecting against cognitive decline and dementia. Possible explanation for this finding is that a sufficient supply of substrates for antioxidant synthesis contributes to increasing cerebral antioxidants, especially glutathione (GSH), and reducing free radical generations. A reduction in GSH levels is also noted in brain tissue undergoing oxidative stress in health and disease. In this study, we investigated the association between brain GSH levels and cognitive function as well as the effect of dietary factors on brain GSH levels in aging and AD.

Methods: We studied 22 individuals with AD (AD group: n=22, clinical dementia scale 1-2) and their closely age matched healthy older adults (AG group, n=22). Brain GSH
was measured using a specially designed ¹H multiple quantum magnetic resonance spectroscopic imaging technique at 3 T from an axial slice positioned across the frontoparietal regions. Dietary intake was assessed with 7-day food records and analyzed using NDS-R software. Cognitive function was measured using a neuropsychological test battery.

**Results:** Total dairy servings were correlated with brain GSH levels (p = 0.04). Among dairy foods, milk showed the highest correlation with brain GSH of AG and AD. Both groups did not differ in age, BMI, or fat consumption. Among the neuropsychological tests, Logical Memory II, Selective Reminding Test and digit Span Test scores showed distinctive correlation with brain GSH.

**Conclusion:** These results suggest that increased dairy intake may be beneficial to brain health and cognitive function in aging and AD via increasing cerebral antioxidant capacity. Dairy foods, particularly milk, may offer substrates required for GSH synthesis in the brain with high bioavailability. Higher brain GSH levels may provide neuroprotection via increased cerebral antioxidant defenses to fight against oxidative stress and enhance brain reserve and cognitive function.

**6 IMPOSTORISM DURING THE PRECLINICAL-CLINICAL TRANSITION: FINDINGS IN THIRD-YEAR MEDICAL STUDENTS**

Beth Levant, PhD, MPA¹, Jennifer Villwock, MD², and Ann M. Manzardo, PhD, MSCR³

Departments of Pharmacology, Toxicology, and Therapeutics¹, Otolaryngology², and Psychiatry and Behavioral Sciences³

**Background:** Impostorism, a phenomenon in which individuals distrust their abilities and accomplishments, is a contributor to medical student burnout and an impediment to identity formation as physicians. It can be most pronounced during periods of career transition. Accordingly, this study examined the incidence and severity of impostor syndrome in third-year medical students at the University of Kansas School of Medicine (KUSOM) as they transitioned from the preclinical to clinical phases of their training.

**Methods:** A voluntary, anonymous, 60-item survey was administered to third-year medical students in October-November of the 2018 fall semester. The survey included the Clance Impostor Phenomenon (IP) Scale, the Perceived Stress (PS) Scale, a 2-item burnout inventory, and demographic characteristics.

**Results:** A total of 127 of 215 (59%) students surveyed responded, with N=111 completing the entire survey. The mean IP score was 63.0±14.6 (moderate-to-
frequent impostor feelings) with 51% of respondents meeting the criterion for impostor phenomenon (score ≥62). Impostor score was not affected by gender, minority status, or campus. Perceived Stress score was higher in impostors and in females. The most strongly endorsed impostor items related to fear of failure, rather than doubting past accomplishments or attributing success to luck.

**Conclusion:** The percentage of 3rd-year KUSOM students with impostorism was somewhat greater than previously reported for medical students overall, consistent with the demands of preclinical-clinical transition. These findings also show that medical students manifest a specific subset of impostor characteristics, which may guide the development of interventions to help students negotiate this stressful period of their training.

7 **Pre-Operative Antimicrobial Exposure is Associated with Reoperation in an Elective Non-Colorectal Veterans Affairs Population**

Christopher A. Guidry, MD; Andrew J. Medvecz, MD, MPH; Raeanna C. Adams, MD; Bradley M. Dennis, MD; Shannon C. Eastham, MD; Oscar C. Guillamondegui, MD, MPH; Oliver G. Gunter, MD; Richard S. Miller, MD; Allan B. Peetz, MD; Callie M. Thompson, MD; Stephen P. Gondek, MD; Timothy C. Nunez, MD; Robert G. Sawyer, MD; Addison K. May, MD; Mayur B. Patel, MD, MPH

1Division of Trauma, Acute Care Surgery and Critical Care; Department of Surgery; 2Division of Trauma and Surgical Critical Care; Department of Surgery/Vanderbilt University Medical Center, Nashville, Tennessee, USA; 3Department of Surgery/Western Michigan University Homer Stryker School of Medicine, Kalamazoo, Michigan, USA; 4Department of Surgery / Atrium Health, Charlotte, North Carolina, USA

**Background:** Patient-reported pre-operative antimicrobial exposure has been recently associated with poor outcomes following elective surgery. This study is intended to evaluate this potential association in a Veterans Affairs (VA) population.

**Methods:** Elective non-colorectal general surgery cases occurring from January 1, 2013 – December 31, 2017 in the Veterans Affairs Surgical Quality Improvement Program (VASQIP) were identified. Outpatient antimicrobial exposure in the 90 days prior to surgery was identified from the VA outpatient pharmacy database. Patients admitted to the hospital within 90 days prior to surgery or were on immunosuppression in the previous year were excluded. Also, patients with a dirty / infected wound class as well as evidence of SIRS, sepsis or septic shock at the time of surgery were excluded. Standard univariate statistics were used. Multiple logistic regression was used performed. The threshold for significance was p<0.01.
Results: 21,112 patients met our inclusion criteria with 2,885 (13.7%) having documented antimicrobial exposure in the 90 days prior to surgery. Exposed patients had higher rates of complication (7.1% vs 8.5%; p=0.005), longer length of stay, and higher rates of unplanned return to the operating room (2.7% vs 3.8%; p=0.001). On multivariate analysis, recent antimicrobial exposure was independently associated with unplanned return to the operating room (OR: 1.39; 99% CI: 1.05-1.84).

Conclusion: Recent antimicrobial exposure is associated with increased need for return to the operating room in this population. While the cause remains unclear, pre-operative dysbiosis due to antimicrobial exposure is a possibility. More work is needed to further characterize this association.

8 SPECC1L-deficient Primary Palate Mesenchyme Cells show Impaired Collective Cell Migration Attributes that are Rescued by Upregulation of PI3K-AKT Pathway

Jeremy Goering1,5, Dona Greta Isai1,5, Everett Hall1, Nathan Wilson1, Edina Kosa1, Luke Wenger1, Zaid Umar1, Abdul Yousaf1, Andras Czirok1, Irfan Saadi1*.

1Department of Anatomy and Cell Biology, University of Kansas Medical Center, Kansas City, KS. 5These authors contributed equally. *Presenting author.

Background: Clefts of the lip and/or palate (CL/P) are common anomalies that occur in 1/700 live-births. Patients with pathogenic SPECC1L variants show a range of craniofacial defects including hypertelorism and CL/P. Specc1l null mutants were embryonic lethal with defective neural tube closure. Hypomorphic Specc1lΔC510 truncation mutants died perinatally, but did not show cleft palate. Specc1lnullΔC510 compound mutants resulted in transient oral adhesions, subepidermal blebbing, and delayed palate elevation. Palate elevation requires extensive remodeling of the neural-crest-derived palate mesenchymal cells, which we posit involves collective directional cell movement (CCM).

Methods: We performed live time-lapse microscopy of wildtype and SPECC1L-deficient primary mouse embryo palatal mesenchyme (MEPM) cells in open-field and wound-healing assays.

Results: Wildtype MEPMs indeed showed cell-stream formation – a CCM attribute – and these streams were consistently narrower for SPECC1L-deficient cells. SPECC1L-deficient MEPM cells also showed delayed wound-healing. Movement parallel to the direction of wound-front propagation can be measured as an attribute of CCM. Trajectories of SPECC1L-deficient cells showed increased movement perpendicular to the direction of wound-healing. In the presence of adequate motility, this
diminished directionality likely caused delayed wound-healing. We previously reported reduced PI3K-AKT signaling upon SPECC1L deficiency. Consistently, activation of the PI3K-AKT pathway using 740-Y-P small-molecule activator rescued wound-healing delay, and the underlying CCM defect, in SPECC1L-deficient MEPM cells.

**Conclusion:** Our data are the first to show CCM attributes in MEPM cells, and to propose the use of MEPM cells to study mesenchymal remodeling during palatal shelf elevation. We also show a novel role for SPECC1L in CCM through modulation of PI3K-AKT signaling.

This project was supported in part by the National Institutes of Health grants DE026172 (I.S.). Core support and pilot funding was also provided by National Institutes of Health Center of Biomedical Research Excellence (COBRE) grant (P20 GM104936), Kansas IDeA Network for Biomedical Research Excellence (INBRE) grant (P20 GM103418), and Kansas Intellectual and Developmental Disabilities Research Center (IDDRC) grant (P30 HD 002528).

**9** Ipsilateral and concurrent breast cancer and atypical ductal hyperplasia: Does atypia also need surgical excision?
Amanda L. Amin, MD MS\(^1\); Fang Fan, MD PhD\(^2\); Onalisa D. Winblad, MD\(^3\); Jamie L. Wagner, DO\(^1\)

\(^1\)Department of Surgery; \(^2\)Department of Pathology; \(^3\)Department of Radiology

**Background:** Standard of care for management of atypical ductal hyperplasia (ADH) identified on percutaneous biopsy is surgical excision. Multiple studies have identified features associated with ADH that are lowest risk for upgrade, which can be offered observation. Presence of an ipsilateral breast cancer is an exclusion criterion for observation of ADH in these studies.

**Methods:** This retrospective analysis examined patients who had both breast cancer and ADH in the same breast at separate sites diagnosed on percutaneous biopsy, who underwent excision of both areas from 2008-2018. Imaging characteristics and pathologic features were reviewed from the biopsy, as well as the final surgical pathology at the site of ADH to determine features associated with ADH upgrade.

**Results:** Sixty-two women met study criteria over the 10-year study period. The overall upgrade rate at the ADH site was 17.7\%: 9 to ductal carcinoma in situ (DCIS) and 2 to invasive breast cancer (IBC). Upgrade was more likely if the ipsilateral malignancy was DCIS over IBC (p=0.034), if ADH biopsy used ultrasound guidance (p=0.019), and if ADH had necrosis (p=0.039). Neither the radiographic size of the ADH nor the
distance between ADH and cancer were associated with upgrade. The group at lowest risk for upgrade had stereotactic biopsy of the site of ADH and no ADH necrosis (0% upgrade).

**Conclusion:** Presence of ipsilateral IBC does not increase ADH upgrade risk. If breast conservation is desired, observation at site of ADH can be safely considered for those with low risk features after strict multidisciplinary review.

10 Telephone Based All Nations Breath of Life Smoking Cessation Program for American Indians
Jason Hale, MA
Department of Family Medicine

**Background:** Lung cancer is the leading cause of cancer death and cardiovascular disease is the overall leading cause of death among American Indians (AI). A major risk factor contributing to this premature mortality is the fact that AI have the highest smoking rates of all major ethnic groups in the US, approaching 40% in some populations. The mortality rate of AI due to tobacco use is double that of other ethnic groups. Our objective was to develop and pilot test a telephone based culturally-tailored smoking cessation program for American Indians using community based participatory research.

**Methods:** We developed a telephone based smoking cessation program through modifications to our existing All Nations Breath of Life (ANBL) group-based smoking cessation program.
Phase I: Program Development Interviews were conducted with former ANBL program participants (N=10) to determine program modifications. We then conducted focus groups with AI smokers (N=2 groups 16 participants) to determine cultural relevance and applicability of a telephone based version of ANBL.
Phase II: Pilot test tANBL with 80 AI smokers through a single arm intervention with structured baseline and 12-week interviews. We biochemically verify self-reported smoking status at 6 months post-baseline.

**Results:** The Telephone Based All Nations Breath of Life (tANBL) program includes four basic components: individual telephone counseling, the culturally tailored curriculum, motivational text messaging, and American Indian facilitators. tANBL is an intense program for 12 weeks with follow-up to 6 months.

**Conclusions:** tANBL has just completed pilot testing and 6-month post-baseline follow up with participants
11 Project ECHO in Kansas: Qualitative assessment of participants' perceptions of self-efficacy, knowledge translation, and rural-urban comparisons
Ryan Spaulding1,2; Whitney Henley1; Jan Lyon1; Melissa Lopez1; Shawna Wright1,3; Carla Deckert1
1KU Center for Telemedicine & Telehealth; 2Department of Biostatistics and Data Science; 3Dept. of Psychiatry and Behavioral Sciences

Background: The University of Kansas Medical Center (KUMC) began its Project ECHO program in 2016 and has experienced rapid programmatic and participation growth. ECHO sessions across many different diagnoses and specialties have been completed, such as ADHD, Asthma, Pain Management, Opioid Addiction Treatment, Pulmonary Fibrosis, and many others. This study is being conducted to better understand participants’ perceptions of their learning and ongoing participation.

Methods: Using the Grounded Theory Approach, the research team conducted 22 semi-structured interviews of ECHO attendees. Interviews used a standard guide and were conducted by trained research team members. Interviews were audio recorded and transcribed. For the quantitative analysis, descriptive statistics were computed. For the qualitative analysis, a Thematic Content Analysis was conducted by the research team and included coding of responses, checking for intercoder agreement, and completing a thematic analysis to identify patterns within the data.

Results: When asked about ECHO’s effectiveness, a majority of respondents reported that ECHO is more or much more effective than in-person lectures (61.9%) and traditional webinars (90.5%). A minority of respondents find ECHO to be more effective than hands-on experiences (28.6%) and 1:1 mentoring (28.6%). The participants had favorable views on ECHO’s effects.

Conclusion: Self-selection bias may have influenced results as respondent data may not be representative of non-responders. Project ECHO is a unique and valuable learning opportunity for Kansas healthcare providers. This study helped the research team to understand the perspectives of ECHO participants ECHO as a program and what they believe they gain from attending ECHO sessions.

12 SPEEKO for Elderspeak: Developing A Self-Monitoring App to Improve Communication and Reduce Behavioral Symptoms in Dementia Care
Kristine Williams RN, PhD, FGSA, FAAN, and Carissa Coleman, PhD, University of Kansas School of Nursing; Nico Aguilar: Anthony Pham, and Clarissa Shaw, University of Iowa College of Nursing

Aims: Nursing care of older adults with dementia is complicated by behavioral and
psychological symptoms that disrupt care. Nursing home staff frequently use elderspeak (patronizing communication that sounds like babyspeak) that is linked to resistive behavioral responses in residents with dementia. Staff communication training has improved communication and has reduced behavioral symptoms and the use of antipsychotic medications to control behavioral symptoms during care. To further enhance effects of the evidence-based Changing Talk (CHAT) communication training program, an automated performance-based app that uses natural language processing was developed to provide immediate reinforcement of communication training to staff at the point-of-care.

**Methods:** SPEEKO for Elderspeak was developed using secondary analysis of archived recordings of staff-resident communication to identify the most prevalent diminutives (commonly used elderspeak terms of endearment) and then to train algorithms to detect and provide feedback to direct care staff on elderspeak use. Laboratory-based proof of concept testing was completed.

**Results:** With a preliminarily trained natural language processing detection model, accuracy testing resulted in a sensitivity (true positive rate) of 87.7% and a specificity (true negative rate) of 99.9% for detecting diminutives. Further app modifications were completed to enhance recording quality and transcription accuracy and to filter noise.

**Conclusions:** If effective in boosting and reinforcing communication training effects, this readily scalable app that uses available technology can be disseminated across long term care settings with potential to improve dementia care. Feasibility testing and a small RCT are to test preliminary effects in clinical nursing home settings are planned.

13 **Changes in target-dependent neuromodulation during BCI learning**
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**Background:** Brain-computer interface (BCI) research provides a unique opportunity to study neural adaptation and learning. In this analysis, we investigate the degree to which the subjects selectively modulated the four neural dimensions used for control of a BCI and whether the dimensions have (i) larger magnitude and/or (ii) more consistent modulation than non-BCI dimensions.

**Methods:** The BCI task involved the direct control of a virtual hand by a monkey (Macaca mulatta) using 16 neurons recorded from primary motor cortex to attain a target hand position. The 90 session experiment started with restricted two-
dimensional hand control and subsequently expanded to full four-dimensional control.

**Results:** With the addition of each new BCI dimension the magnitude increased rapidly during the first sessions and then later decreased as the subject became more practiced. There was a steady increase in consistency throughout the experiment, which tracked the constantly improving performance of the subject. The neural activity in the BCI control dimensions increased slowly in both consistency and magnitude over the entire experiment relative to the non-BCI dimensions.

**Conclusion:** Our analysis of the magnitude and consistency of neural modulation suggested three distinct processes with different time courses (i) initial large changes in magnitude, (ii) increases in consistency that lead to increased performance, and (iii) finally selective modulation in only BCI-specific dimensions for increased efficiency. These techniques identifying the magnitude and consistency of neural signals could be translated to future studies of learning to better characterize the time courses of such neuromodulation under different conditions.

14  **Does Participation in Quality Improvement Affect Clinician Burnout?**
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**Background:** Burnout among healthcare professionals is a threat to both workforce and patient well-being. Based on Spreitzer’s Integrative Model of Human Growth at Work, execution of quality improvement (QI) projects could be posited to reduce burnout if the workforce gains control over a dysfunctional worksite or to increase burnout if the workforce loses autonomy. This meta-analysis explores the link between workforce participation in the design of QI or practice redesign initiatives and impact on levels of burnout.

**Methods:** We meta-analyzed studies published through January 2019 that executed QI projects, measured burnout, and had either concurrent or historical controls.

**Results:** Six controlled studies with 6842 healthcare professionals were included. 66% of professionals were in the VA PACT study. One study, the Healthy Work Place (HWP) trial, was randomized. All interventions included components of workflow improvement. Meta-analysis showed no overall effect on burnout (odds ratio: 0.95; 95% CI 0.74 to 1.23); however, heterogeneity was substantial (I²=72%). Whether healthcare professionals had local control over project design significantly modulated the results: studies granting local control tended to reduce burnout (odds ratio 0.77; 95% CI 0.57 to 1.03; I²=44%) whereas studies not clearly granting local control tended to increase burnout (odds ratio 1.29; 95% CI 0.91 to 1.81; I²=80%).
Conclusions: There is substantial heterogeneity in the impact of practice transformation and QI initiatives on workforce burnout. Burnout can be avoided, and likely reduced by both workforce involvement in implementation decisions and also addressing workflow. These findings are consistent with Spreitzer’s Integrative Model of Human Growth at Work.

15 The Evidence-Practice Gap in Healthcare Leadership Training
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Background
The RAND found that in the U.S. approximately half of indicated medical care occurs. This suggests poor dissemination of medical innovation. Improving this dissemination has been claimed to be more effective than discovering new medical treatments. The goals of the current study are to 1) use a structured search for evidence to determine best practices to foster organizational innovation, 2) compare the recommendations with the content in studies of training in health care leadership for physicians.

Methods: The 6S search strategy was used. The search started with online textbooks of organizational psychology that were recommended by either two professional societies in organizational science. Next, 16 selected journals were searched for meta-analyses. Lastly, to identify emerging concepts in leadership, the same journals were searched for quantitative studies, followed by non-quantitative reviews and proposals.

Results: Two online textbooks met our inclusion criteria and yielded three leadership tactics. No guidelines produced by professional societies in organizational science were found. Additional tactics were inventoried from our search of journals.

Regarding the teaching of these tactics, teaching at least one tactic found in our search was reported in 60% of courses in academic health centers and only 20% or less of courses in clinical settings. One review of the impact of leadership training suggested that the benefit focused on the personal achievement of participants more than the participants’ institutions.

Conclusion There is an evidence-based practice gap in organizational science and medical leadership akin to the gap between medical science and clinical practice.
16 **What is the Relationship Between Hospital Staff Engagement and Mortality?**
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**Background:** Current research on healthcare workforce focuses on burnout and its consequences. We examine whether workforce engagement promotes organizational performance.

**Methods:** We measured workforce engagement with three questions from the National Health Services (NHS) Staff Surveys that correspond to validated factors. Organizational performance was measured by the summary Hospital-level Mortality Indicator (SHMI), available for all English hospital Trusts from 2012 to 2018. In the first analysis, SHMI was the dependent variable, predicted by engagement measured in the prior year, current year, and year following SHMI measurement while controlling for SHMI in the prior year. For the second analysis, cross-lagged regression measured the associations of SHMI with engagement in both directions using the optimal lag time found by the first analysis. Heterogeneity in engagement across Trusts in 2017 was measured with meta-analysis.

**Results:** In the first analysis, current SHMI was negatively associated with current engagement ($\beta = -0.05; p = 0.041$), engagement in the ensuing year ($\beta = -0.07; p = 0.006$) but not with engagement in the prior year. In the second analysis: a) Engagement predicted same-year SHMI after controlling for prior year SHMI ($\beta = -0.04; p = 0.040$) and 2) SHMI predicted engagement in the same year ($\beta = -0.07; p = 0.001$) after controlling for prior-year engagement. In 2017, heterogeneity of rates of engagement was considerable ($I^2 > 85\%$).

**Conclusions:** We found that higher workforce engagement predicts lower mortality which in turn predicts engagement. The considerable heterogeneity in rates of workforce engagement suggests opportunity for mutual learning across Trusts.

17 **Non-linear meta-regression to explain heterogeneity of results of screening for prostate cancer with PSA**
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**Background** The utility of Prostate Screening Antigen (PSA) to screen for prostate cancer has been debated with the most recent assessment by the BMJ Rapid Recommendation estimating that 1 man in 1000 will benefit after 10 years of screening. We update our prior systematic review with the recent CAP trial.
Methods We conducted a living systematic review using openMetaAnalysis. As in our first review, each ESPC trial site was considered a unique study. We included the CAP trial and updated our earlier linear regression with an exponential model that is more biologically plausible. For example, an exponential model projects a limit to the benefit of screening, whereas linear regression projects an increase in benefit towards infinity.

Results When all trials are pooled together there is no significant benefit from screening. However, the results include the possibility of substantial heterogeneity ($I^2=27$; 95% confidence interval 0% to 63%). Linear regression reduced the heterogeneity to 12% and the exponential regression reduced heterogeneity to 0%. Exponential regression indicated significant benefit among trials that added 3.5 or more years of screening coverage (RR: 0.67; CI 0.52 to 0.85) This leads to an absolute risk reduction of 0.2% and number needed to screen of 500.

Conclusions We estimate more optimistically than the BMJ Rapid Recommendation. We project that after 3.5 years of screening 1000 men two deaths from prostate cancer will be subsequently averted. This review is maintained at http://openmetaanalysis.github.io/psa/

18 Impaired Iron-sulfur-cluster Redox Regulation in Monogenic Ncb5or Diabetes
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Background: Monogenic diabetes occurs naturally in low frequency but offers rare insights into important pathways that protect pancreatic beta-cells from dysfunction and demise. These cells rely on endoplasmic reticulum (ER) and mitochondria for insulin maturation and secretion. The risk for ER and oxidative stress is increased in patients with hereditary hemochromatosis, Friedreich Ataxia or Wolfram Syndrome 2 (WFS2) when iron or iron-sulfur-cluster (ISC) status is altered. Ncb5or is a cytosolic ferric reductase widely expressed in animal cells. Ncb5or deficiency in mice results in early-onset lean diabetes, ataxia and hearing loss in association with altered iron metabolism, mitochondrial dysfunction, and ER stress, similar to clinical manifestations in WFS2 patients carrying CISD2 gene mutations. CISD2 protein is localized on ER and contains a redox sensitive [2Fe-2S] ISC, which becomes labile when oxidized but can be stabilized by pioglitazone in vitro. We hypothesize that Ncb5or functions as a reductase of CISD2 to regulate its redox status and exert its cytoprotective action.
Methods: We treated KO mice with pioglitazone for 7 weeks post weaning, monitored blood glucose, and measured molecular markers and Fe^{II}-ISC CISD2 content in tissues.

Results: The liver of untreated KO mice display reduced Fe^{II}-ISC content among total CISD2. Pioglitazone treatment rescues this defect, delays the onset of diabetes, and attenuates stress response in KO mice. Pioglitazone also rescues mitochondrial dysfunction in KO mouse embryonic fibroblasts.

Conclusion: Ncb5or is required to maintain CISD2-ISC redox status, and pioglitazone treatment delays Ncb5or diabetes by stabilizing CISD2 action. Our findings have implications for diabetes treatment.

19 Longitudinal Modeling of the Development of Self-Assessment Ability in a Simulation-Based Central Line Insertion Course
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Introduction
Health professionals must constantly update their knowledge and skills and discern when a situation is beyond their current abilities,(1) making effective self-assessment and self-regulation of learning essential.(2) Past studies suggest learners self-assess poorly, and some oppose encouraging self-assessment at all.(3) However, perhaps learning experiences are not yet well-designed to increase self-assessment accuracy. We hypothesized a simulation-based curriculum can improve learners’ self-assessment of central line insertion ability.

Methods
Across AY2016-18, internal medicine residents (n = 150) self-assessed central line insertion ability once before and once after formal feedback and instruction. We analyzed Percentage Disagreement, reflecting the amount of disagreement learners showed with an expert observer score, and Direction when Disagreeing, reflecting tendency to under- vs. over-estimate one’s performance relative to the observer score.

Results
Mean Percentage Disagreement improved from pre-test to post-test, decreasing from 30% to 19% (Wilk’s Λ = .865, p < .001), and improved across academic years (p = .023). Direction when Disagreeing means were +31% at pre-test and +37% at post-test; beta regression showed no discernible difference (p = .12). However, there was much less overestimation in AY2017-18 than in AY2016 (p < .001).
Conclusion
Residents improved their self-assessment within and across curricular years. Our results suggest self-assessment can be developed, if it is anchored to specific learning objectives, repeated skill assessment with feedback, and clear “gold standard” performance definition. Future research should evaluate whether self-assessment in simulation translates to enhanced discernment and self-regulated learning in the clinical environment.

References

20 Standardization and Implementation of BioPsychoSocial Screening at an Academic Medical Center
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Background: Utilization of standardized screening tools facilitates timely and effective identification of clinical and social comorbidities. Electronic health records (EHR) collect data for clinical, quality improvement and research purposes. However, redundancy of analogous screening tools in the EHR may duplicate work and conflate data without a standardized process and optimal utilization of existing tools. Inappropriate utilization of copyrighted screening tools could develop into liabilities for clinicians, researchers and the supporting entities.

Methods: Narrative review of the development, growth and implementation of the BioPsychoSocial Screening Committee since 2017 including current and completed projects and outcomes.

Results: Identification of current scales in use at the University of Kansas Health System demonstrates errors in implementation, inconsistent application, and inefficient utilization. We present a survey of scales at use currently, and the process for a
centralized location with consistent documentation formats and locations within the BSC. We present examples of training of biopsychosocial screening tools in the EHR and how we assess efficacy and effectiveness in application and patient care.

**Conclusion:** Standardization and optimization of biopsychosocial screening requires frequent collaboration between clinicians, clinical leaders, researchers and EHR specialists. Ultimately, this collaboration will allow for higher veracity and volume of data to improve clinical care and conduct research.

### 21 Demographic of Patients in Palliative Care Prescribed Opioids
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**Background:** Assessing risk for opioid misuse is an important part of outpatient palliative care. Palliative care clinicians need to dedicate limited resources and time to those at risk. This approach will provide palliative care clinicians with a better understanding of their patient populations through analyzing demographic data.

**Methods:** Data was obtained from the electronic medical record and analyzed with tests for central tendencies, z-test for proportion for testing the relationship between ORT categories and gender, and analysis of variances (ANOVA) for testing the relationship between pain rankings and ORT.

**Results:** After running a z-test for proportion for all risk classifications against gender, a statistical significance between the genders in low-risk ($p < 0.05$) and high-risk ($p < 0.05$) classifications were found which there was no statistical significance in moderate-risk group ($p > 0.05$). The ANOVA was also statistically significant ($p < 0.001$).

**Conclusion:** Male and female genders were distributed unequally among categories they should have been insignificant in all categories. Systematic bias of the ORT with how it allots points for males versus females could have impacted this. ANOVA shows that the ORT classification and average pain score were not completely independent. This helps clinicians to understand that this population self-assessed to have higher pain which could mean having more dialogue about pain management, goals, or including other specialties for pain management.

### 22 PDAC development and progression is dependent upon SHP2
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**Background:** Oncogenic Kras is a driver of pancreatic ductal adenocarcinoma (PDAC), and the high mortality of PDAC is due in part to ineffective suppression of KRAS. Obesity is a significant risk factor associated with pancreatic cancer. Cytokine and growth factor levels are increased in obese patients, which drive KRAS via SHP-2. Our current study was designed to determine if SHP-2 was essential for KRAS mediated PDAC development and progression.

**Methods:** A phosphatase array identified a subset of tyrosine-phosphatases altered in PDAC cell lines treated with adipose factors. SHP-2 levels were assessed in PDAC tissue using immunohistochemistry and western blot analysis. PDAC cells were stimulated with pro-tumorigenic factors with/without SHP-2 inhibitors and monitored for biological and molecular response. Pancreas specific deletion of SHP-2 (SHP2Δ-KPC: SHP2fl/fl; KrasG12D+/-; Pdx1cre) within the KPC (KrasG12D+/-; p53R172H; Pdx1cre) mouse model was used to determine necessary for SHP-2 in PDAC development.

**Results:** Our results revealed adiponectin suppressed activation of SHP-2, and prevented RAF-RAS-ERK signaling. Immunohistochemical analysis of tissue showed increased phosphorylated SHP-2 in PDAC tumors compared to adjacent normal pancreas. Pharmacological inhibition of SHP-2 prevented cytokine-induced activation of ERK in PDAC cells as well as cell proliferation and migration. Analysis of pancreatic tissue from SHP2Δ-KC mice revealed an absence of PanIN lesions.

**Conclusion:** We show that SHP-2 is essential for PanIN development even in the presence of oncogenic Kras and inhibition of SHP-2 can suppress cytokine induced PDAC progression. Therapeutic strategies targeting SHP-2 activity has a high potential to improve survival of PDAC patients.

**“LIVE on Facebook:” An online program to increase access to education, resources and support for rural reproductive-age women**

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**Background:** In the U.S., approximately 9 million reproductive age rural women need access to healthcare services. Rural pregnant women experience unique barriers including long distances to hospitals, limited health resources, and closing of hospitals. Results from three studies in rural Kansas demonstrate significant chronic disease risk factors among at-risk pregnant women. The goal of this session is to discuss an innovative program that provides education, resources and support to this population.
Methods: An online program titled “Pioneer Breastfeeding Network” (PBN) was implemented to provide education on diabetes, breastfeeding, safe sleep practices, and nutrition to rural women. Content areas for education were aligned with the Diabetes Prevention Program, Office on Women’s Health, and ChooseMyPlate.gov. Real-time live sessions were presented and archived within a secure Facebook group between September 2018 and March 2019. Subject matter experts presented each session. Data were collected on participant satisfaction.

Results: As of August 2018, PBN has 118 active participants and about 200 posts. PBN averages eight postings per week and five “likes” per post. A total of ten educational sessions were completed; each session enjoyed an average of 43 views. Twenty three (N=23) women responded to the satisfaction survey. The majority reported increased knowledge regarding the topic at hand, increased understanding of health benefits for baby and one’s own health, and increased peer connections. Easy access, flexibility to watch sessions, and peer support were equally important.

Conclusion: Through inter-professional collaboration among the project team, healthcare providers and public health departments, PBN has successfully transitioned to local administration.

24 Administration of Sugammadex Induced Anaphylaxis (ASIA): A Clinical Review
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Background: Sugammadex (Bridion®; Merck & Co., Inc. Kenilworth, NJ, USA) is the only available drug capable of selective reversal of the neuromuscular blockade. Publications reporting administration of sugammadex induced anaphylaxis (ASIA) for presentation, treatment, outcome, and diagnostic tests have been examined.

Methods: PubMed, Web of Science, Cochrane Library, and the Japanese Society of Anesthesia website were searched using the following keywords: sugammadex, allergy, anaphylaxis, hypersensitivity, reaction, anaphylactoid, and hypotension. Total of 42 cases of ASIA were included.

Results: The mean sugammadex dose administered was 2.6 mg/kg (range 0.7 to 4.9). ASIA occurred typically within 1-5 minutes of drug administration. No patients had prior exposure to sugammadex. Profound hypotension (85.7%) was the most common presenting sign. Decline of mean blood pressure of 50% was frequent. Skin rash was reported in 71.4%, tachycardia in 59.5%, bronchospasm in 31% of cases, and angioedema in 26.2% of cases. Four patients (9.5%) required (re)intubation. Intravenous epinephrine was the most commonly vasoactive agent used (69% of cases). More than
one third of affected patients remained intubated (38.5%) while 46.4% of reported patients were transferred to the ICU. Intradermal test and skin pin-prick were positive in 86.7% and 76.5% of tested patients respectively. Tryptase was positive in 72.3% of tested patients while IgE was positive in 100% of patients (4/4).

**Conclusion:** Patients should be closely observed for 10 minutes following intravenous administration of sugammadex for presenting symptoms of ASIA: deterioration of vital signs, development of skin rash, and increased peak airway pressure. Re-intubation may be required.

25 **Co-localization of Hepatocellular Uptake Transporters in Detergent Resistant Membranes (Lipid Rafts)**

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**Background.** We have previously shown that several transporters located in the basolateral membrane of human hepatocytes (OCT1, NTCP, OATP1B1, and OATP1B3) interact with each other. These interactions affect both surface expression and function. Currently, transporter studies are performed using cell lines that express a single transporter at a time without considering how transporter interactions will affect function. Determining how transporters co-localize, e.g. in detergent resistant lipid rafts or via direct protein-protein interactions, has far-reaching implications for drug metabolism and pharmacological studies.

**Aim:** The purpose of this study is to test the hypothesis that these transporters co-localize with well-known lipid raft marker proteins.

**Methods.** Following homogenization in 1% Triton X-100 on ice, lipid rafts were isolated from HEK293 cells expressing NTCP, OCT1, OATP1B1, and OATP1B3, or from frozen human liver samples. Homogenates in 40% sucrose were overlaid with a discontinuous 5% to 35% sucrose gradient. After centrifugation for 18 hours at 197,000 x gov, gradients were fractionated, and aliquots were analyzed using western blotting. The blots were probed with antibodies against positive (caveolin and Na+/K+ ATPase) and negative (clathrin) lipid raft markers, as well as with transporter-specific antibodies.

**Results.** In human liver, caveolin, Na+/K+ ATPase, OATP1B1, OATP1B3, and OCT1 were detected in similar fractions. OCT1 also was found in clathrin-positive fractions towards the bottom of the gradient. In HEK293 cells, NTCP and OCT1 co-localized with caveolin in the middle of the gradient and again, OCT1 was also found towards the bottom of the gradient.
**Conclusion.** The detection of NTCP, OCT1, OATP1B1, and OATP1B3 along with the positive lipid raft markers caveolin and Na⁺/K⁺ ATPase indicates that co-localization of these transporters occurs, at least in part, because of their residence in detergent resistant membrane domains. Future experiments are aimed at identifying the functional consequences of this co-localization.

**26 A Novel Method for Measurement of HDL particle and HDL-C Kinetics in Humans**

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**Background:** Low HDL-cholesterol (HDL-C) concentrations are strongly associated with coronary artery disease, but treatments that raise HDL-C concentration have produced disappointing results. It has been proposed that interventions should target HDL flux, but it is unclear whether available methods accurately quantify reverse cholesterol transport (RCT). We sought to develop an autologous primary pool tracer for HDL by simultaneously labeling apoA1 (an HDL particle label) and HDL-C with [U-¹³C] phenylalanine and [²H₆] cholesterol, followed by harvesting of labeled HDL particles by plasmapheresis, isolation and cryopreservation for subsequent reinfusion of labeled HDL.

**Methods:** Tracers (200 mg phenylalanine, 250 mg cholesterol) were administered orally or intravenously to healthy volunteers. Multiple blood samples were obtained over the subsequent 24-72 h.

**Results:** HDL was isolated from 72 ml plasma. After storage in 10% sucrose at -80°C for 3 months, there was no change in HDL particle size or cholesterol efflux capacity compared with fresh plasma. Recovery of HDL after passage through a 0.22 µm filter was 98-99%. With oral tracer, enrichment was only ~0.3% for cholesterol and ~0.1% for phenylalanine, but intravenous administration produced peak enrichments of ~1.1% in HDL-C (at ~20 h) and ~0.7% in apoA1 phenylalanine (at ~12h).

**Conclusions:** An autologous tracer has been developed for measurement of HDL-C and particle kinetics employing endogenous labelling, harvesting and cryopreservation for subsequent reinfusion. Assuming adequate tracer doses, a 10% loss of HDL during processing an HDL volume of distribution of 4 liters and a detection limit of 0.002%, tracer disappearance should be measurable for 3-4 half lives.
A Single Center, Retrospective Study Comparing Sternotomy Closure with Rigid Plate Fixation to Standard Wire Cerclage in Obese Patients

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Objective: In cardiac surgical patients, debate remains concerning optimal sternal closure after sternotomy. Some studies identify that sternal closure with rigid plate fixation offers advantages when compared to traditional wire cerclage, while others demonstrate no difference. This study aims to compare outcomes after median sternotomy closure with rigid plate fixation (RPF) to standard wire cerclage (WC) in obese patients.

Methods: This retrospective, single center study analyzed 508 obese patients undergoing sternal closure with RPF (n = 149) or WC (n = 359) between January 2015 - May 2017. The primary endpoint was presence of non-healing sternal wound evaluated by physical examination and chest x-ray at six weeks postoperatively. Secondary endpoints included sepsis, readmission, reoperation, atrial fibrillation, hemodialysis and mortality.

Results: Rates of both superficial sternal infection (5 (3.4%) vs 6 (1.7%); p = 0.313) and deep sternal wound infection (2 (1.3%) vs 2 (0.56%); p = 0.584) were not statistically significant. Need for sternal revision procedure and readmission to the hospital was also similar in patients receiving RPF closure (4 (2.7%) vs 7 (1.9%); p = 0.738) and (21 (14.1%) vs 43 (12.0%); p = 0.557), respectively. Rates of sterile dehiscence (1 (0.67%) vs 8 (2.2%); p = 0.295), 30-day mortality (6 (4.0%) vs 13 (3.6%); p = 0.801) and other secondary outcomes were not different among the groups.

Conclusions: Sternotomy closure with rigid plate fixation when utilized in obese patients did not result in significantly higher rates of superficial and deep sternal wound infections and need for sternal revision procedures.

Kansas' Response to the Opioid Crisis: Implementation of an ECHO model to teach providers in urban and rural Kansas

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2019 Faculty Poster Session
~Continued~

Objectives: Our SAMHSA-funded project uses ECHO technology to extend Opioid use disorder (OUD) treatment model to rural Kansas counties, and urban areas in Kansas to teach the providers about opioid use disorder and medication assisted treatment. Using secure videoconferencing, the Project ECHO co-management model links rural primary care providers with addiction psychiatrists and therapists for 1-hour accredited tele mentoring sessions, including de-identified cases and brief didactics.

Methods: As one of the first psychopharmacology ECHOs in state of Kansas for opioid use disorder, the trial will summarize findings from surveys interviews and feedback forms provided to participants at the end of sessions. It described: 1. Developing an accredited curriculum and case format, leveraging community feedback as well as American Academy of Addiction Psychiatry (AAAP), American Psychiatric Association (APA) and American Society of Addiction Medicine (ASAM) practice standards to treat OUD with Medication assisted treatment (MAT); 2. Adapting training protocols, including reminders to follow HIPAA best practices; and 3. Recruiting/retaining sites.

Results: Across eight 1-hour sessions, there were 220 registered participants and sites. An Average of 66 sites joined for each session (teams often joined together as one group for a session). Preliminary findings suggested credentials breakout of participants as Physicians: 40%, Nurse Practitioner & Physician Assistants: 5%, RN: 10%, Social Workers: 10%, Psychologists and Addiction Counselors: 15%, Pharmacists: 5%, Administrators and Others 10%. There was one didactics presenter and one case discussion per session. All elements of the national ECHO model were feasibly implemented. Finding a consistent meeting time across sites/expert panelists was the largest challenge. There were minimal challenges with the secure videoconferencing solution, likely due to ongoing technical support. Findings suggested that the greater the number of sessions attended, the greater impact on self-reported knowledge and confidence around best practices. Didactic topic areas of highest interest were setting up a buprenorphine clinic and medication assisted treatment for opioid use disorder. Satisfaction Scores from 287 participants requesting CE reported 43% found the sessions Extremely helpful, 46% Very helpful and 11% Somewhat helpful.

Conclusions: The results indicate the MAT Psychopharmacology ECHO was feasible and well-received by rural/urban practitioners and the expert panel. Utilizing a quality improvement approach and the lessons learned strengthened upcoming ECHO series. Updates include: 1. Inviting a broader audience, including primary care, mental health providers, community mental health, insurance companies, Kansas department of Health and environment, SAMHSA and pain management team, 2. Linking ECHO telementoring with telemedicine follow-up; and 3. Linking participation in ECHO with patient outcomes.
References


29 Treatment of mild cognitive impairment due to Alzheimer’s disease or mild dementia of Alzheimer’s type: Design and rationale of the randomized pivotal study of Renew™ NCP-5
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Background: Vascular dementia and Alzheimer’s disease (AD) share an association with hemodynamic risk factors. Exercise can improve cerebral blood flow (CBF), which is associated with a decrease in cognitive decline. However, patients with AD or mild cognitive impairment (MCI) may have limited exercise capacity due to age-related physical restrictions. Renew™ NCP-5 is an FDA-cleared, external counterpulsation (ECP) device which consistently improves coronary and peripheral vascular hemodynamics by sequential compression and decompression of vascular beds in synchrony with the cardiac cycle, and is currently used to treat patients with chronic angina and congestive heart failure. ECP may provide the same hemodynamic benefit for cerebral perfusion and cognitive function.

Methods: This randomized, Phase 3, pivotal, single-blind, parallel-design, multi-center study (NCT03721705) will assess the efficacy of Renew™ NCP-5 in patients with MCI due to AD or mild dementia (MD) of Alzheimer’s type at 16 sites in the USA, Europe, and Asia. Study participants (see Table 1 for key entry criteria) will be randomized 1:1 to receive a bolus of 35 60-minute Renew™ NCP-5 treatment sessions or sham
therapy with 3–5 sessions per week. Following the initial 35 treatments, a maintenance period will begin with two treatment sessions per week for up to 24 weeks total. (Figure 2). The primary efficacy endpoint is the average of the change from baseline in Vascular Dementia Assessment Scale cognitive subscale (vADAS-Cog) at Weeks 12, 18, and 24. Safety is assessed throughout the study; other key assessments, including the measurement of CBF as a potential mechanistic index of therapeutic engagement through arterial spin labelling perfusion MRI, are presented in Figure 2. At month 12, all subjects will undergo a full assessment, and the sham group will have the option to enter an open-label extension.

**Results:** We hypothesise that Renew™ NCP-5 therapy will lead to effective treatment or delay of cognitive impairment in study participants.

**Conclusion:** This pivotal study aims to evaluate the efficacy and safety of Renew™ NCP-5 as a therapeutic option for patients with MCI due to AD or MD of Alzheimer's type.
The expression of three organic anion transporting polypeptides (OATPs) in normal pancreas and in pancreas cancer. Immunostaining was performed on frozen sections from biospecimens obtained from the biospecimen repository at the medical center.

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