Keynote Speaker—Joseph J. Cullen, MD, FACS

Talk title: Treatment of Pancreatic Cancer with Pharmacological Ascorbate

Bio: Joseph Cullen, MD, is a professor of surgery at the University of Iowa Carver College of Medicine with a secondary appointment in the Department of Radiation Oncology. Dr. Cullen received his Bachelor of Science from Loras College, his MD from the University of Iowa and then completed a general surgery residency at the University of Iowa. He completed a postdoctoral fellowship on a National Institute of Health T32 grant at Mayo Clinic. Dr. Cullen then returned to the University of Iowa in 1993 and rose to the rank of full professor with tenure in 2005. Dr. Cullen's laboratory investigates pharmacological ascorbate ($P\text{-}AscH^-$, high dose, intravenous vitamin C) as an adjuvant to standard of care treatments to treat pancreatic cancer. He is currently the principal investigator and leader of project one on the P01 CA217797, "Exploiting Redox Metabolism Using Pharmacological Ascorbate for Cancer Therapy". Dr. Cullen holds the IND for seven clinical trials utilizing pharmacological ascorbate at the University of Iowa.

Guest Featured Speaker - Rebecca Oberley-Deegan, PhD

Talk title: Redox Metabolism in the Context of Radiation Damage in Fibroblast and Adipocytes

Talk summary: As obesity continues to rise in the United States, more people with metabolic disorders will develop pelvic cancers and require radiation therapy. Recent studies indicate that patients who suffer from metabolic disorders, such as obesity and diabetes, are more prone to develop radiation-induced toxicity and respond less favorably to radiation therapy. Diabetics and obese patients have a significant reduction in serum adiponectin (APN) levels. APN is a fat-derived hormone that stimulates glucose utilization and fatty acid oxidation, while inhibiting reactive oxygen and nitrogen species (ROS/RNS) through AMPK signaling. APN has also been shown to inhibit fibrosis in a variety of animal models; however, the role of APN in reducing radiation-induced fibrosis is unknown. Our preliminary data indicate that APN protects fibroblast cells from radiation-induced cell death and aberrant differentiation. In an animal model of pelvic irradiation, animals receiving exogenous APN had significantly reduced oxidative and nitrosative damage, inflammation and fibrosis as compared to control animals. In the presence of radiation, APN did not protect cancer cells from radiation-induced killing. However, adipose tissues are highly susceptible to oxidative damage after radiotherapy and APN secretion decreases while pro-fibrotic and pro-inflammatory signals are enhanced from these damaged adipocytes and obesity further enhances these changes. The microenvironment produced by adipocytes after radiation exposure may enhance residual tumor progression after radiotherapy treatment. Thus, better understanding the role that adipose tissues play during radiotherapy and regulating oxidative and nitrosative balance could lead to reduced toxicities and better tumor control in patients with metabolic disorders.

Bio: Dr. Rebecca Oberley-Deegan received her PhD from University of Iowa, Iowa City, Iowa, and did her postdoctoral training at National Jewish Health, Denver, Colorado. She joined the University of Nebraska Medical Center (UNMC) in Omaha, Nebraska, in 2014 as an assistant professor and is currently a tenured full professor at UNMC. Dr. Oberley-Deegan's laboratory has previously shown that healthy adipose tissue can secrete factors that prevent radiation induced fibrosis. However, adipose tissues are sensitive to radiotherapy and when damaged promote a pro-inflammatory and pro-oxidative environment, which is speculated to promote tumor progression. Dr. Oberley-Deegan is focusing specifically on the role of free radical signaling to transform adipocytes, fibroblasts and inflammatory cells in normal tissues, which results in damage to these tissues. A better understanding of the cross talk between these tissues during and after radiotherapy will lead to better targeted treatment to prevent radiation-induced fibrosis in cancer patients.

Guest Featured Speaker - Nukhet Aykin-Burns, PhD

Talk title: Targeting Redox Metabolism in Hepatocellular Carcinoma

Talk summary: The incidences of Hepatocellular Carcinoma (HCC), a primary cancer of the liver tissue, continue to rise while treatment options for patients remain limited due to comorbidities (e.g. viral hepatitis, alcoholic cirrhosis, NAFLD, chronic obesity) resulting in reduced normal liver function. Because of their high intracellular antioxidant levels, including glutathione, HCCs can detoxify oxidative species and prevent cellular injury resulting in resistance to therapeutics. Parthenolide (PTL) is an anti-cancer agent, which can target several cellular mechanisms. Interacting with thiols, including GSH, to increase oxidative stress is one of its mechanisms for cytotoxicity. Because the bioavailability of PTL is limited due to its lipophilic nature, delivering PTL directly to the HCC tumor through trans-arterial chemoembolization (TACE) is possible to avoid its solubility issues. This study was proposed to determine if a tumor-localized, high dose of PTL can overcome tumor cell adaptations that lead to poor HCC outcomes by inhibiting GSH biosynthesis and its redox recycling from inducing antitumor activity.

Bio: Dr. Aykin-Burns received her bachelor's in engineering in Turkey (her home country) and her PhD from the University of Missouri–Rolla, focusing on antioxidant-based therapies in lead poisoning. In 2003, she joined the Free Radical and Radiation Biology Program at the University of Iowa as a postdoctoral fellow and was awarded an NCI-funded F32 Fellowship to study metabolic differences between cancer and normal cells which contribute to phenotypic characteristics of cancer cells. In August 2011, she accepted a position as a tenure-track assistant professor in the Division of Radiation Health, Department of Pharmaceutical Sciences, College of Pharmacy at University of Arkansas for Medical Sciences (UAMS). Since 2007, and especially following her faculty appointment at UAMS, her research has focused on cellular bioenergetics, reactive oxygen species, mitochondrial dysfunction, radiation and chemotherapy -induced normal tissue injury in liver, skin and bone, and effects on normal tissue protectant natural products, which may also possess preferential toxicity in cancer cells, such as sesquiterpene lactones, tocotrienols and melatonin analogs.

KCU Featured Speaker - Jennifer Fugate, PhD

Talk title: How the Body Serves the Brain: Translating Embodied Cognition for Learning

Talk summary: Embodied cognition is a psychological theory that understands thinking is represented within the sensorimotor systems of the body that are explicated by neural activity within the brain, and that that cognition is deeply dependent upon features of the physical body within an environment. Thus, we make meaning of the environment through our senses and the way in which we experience the environment shapes our knowledge. Derived from embodied cognition, embodied learning constitutes a contemporary pedagogical theory that emphasizes the body in educational practice, such that learning unfolds through a person's own actions with environmental affordances. Embodied learning shifts the focus of teaching and learning from an exclusively mental effort toward a sensory-rich experience and offers new applications and strategies to maximize learning effectiveness. Additonally, embodied learning recognizes the importance of "action for doing", and is compatible with early developmental theories of learning yet does not limit itself to child development or necessarily require later formal (symbolic) abstraction of thought. Moreover, the implications for how embodied learning affects teacher pedagogy (matching theoretical foundations or concepts with practical methods) has yet to be fully realized. In many instances, our current educational delivery systems (i.e., learning theory, pedagogy, curriculum, environmental design, technology, and educational psychology) and approaches can be traced back to "disembodied" views of human thinking, in which learning is viewed as abstracted and separate from the body, and decontextualized approaches focus on preparation for standardized tests. In many cases, the teacher is still seen as a 'talking head', transmitting the curriculum, and the student is a passive recipient.

In this talk, I will discuss how my colleague and I have designed a framework, derived from the NIH's model of translational science, to provide a model of translating embodied cognition for embodied learning in the classroom. I will also discuss select examples showing how empirical scientific findings from psychology and cognitive neuroscience, many highlighted in our book, Movement Matters, have either already been translated or hopefully will be translated into new classroom learning activities, as part of our growing consortium. In some cases, I will show you how some of these activities have already been successfully brought to scale across districts and, in some cases, with educational game developers. I will end with implications for

augmented reality (AR) and virtual reality (VR) technologies in simulation-based medical education (SBE) as a key component of embodied learning, and how I would envision KCU's Center for Medicial Education Innovation can play a role, and the role of embodied therapeutic practice and techniques in behavioral health.

Bio: Jennifer Fugate, PhD, is a social-cognitive psychologist and expert of emotion and embodied cognition, trained in the cognitive underpinnings of how people construct knowledge and emotion through their language. She is the author of numerous empirical and theoretical pieces on the role of language in emotion, embodied cognition, as well as a certified Facial Action Coder. She received her PhD in Comparative Cognition from Emory University, completing two postdocs in human emotion and cognitive neuroscience with the renowned psychologist and author, Lisa Feldman Barrett at Northeastern University. Dr. Fugate received tenure and promotion at the University of Massachusetts Dartmouth, where she worked for nine years. During this time, her work was featured in Malcolm Gladwell's book, Talking to Strangers. She was awarded Scholar of the Year in 2019. Dr. Fugate is now an associate professor of Psychology at KCU and directs the ABLE (affect, behavior, learning and embodiment) lab for able mind and body. She recently published an edited volume with her colleague, Dr. Sheila Macrine, entitled: Movement Matters: How Embodied Cognition Informs Teaching and Learning (MIT Press, 2022). This book has now generated more than half a million downloads (open access) and sales and is nominated for two major book awards from the American Psychology Association and the American Educator's Research Association. It has also launched an international consortium of embodied scholars to bridge the gap between science and educational practice to transform education and classroom learning using the NIH's translation approach.

KCU Featured Speaker - Gautam Desai, DO, FACOFP.

Talk title: Global Research at KCU

Bio:

- Chair of Primary Care at KCU
- Professor of Primary Care at KCU
- Director of Honors Track in Global Medicine at KCU
- Doctor of Osteopathic Medicine - Michigan State University College of Osteopathic Medicine
- Has 50+ peer reviewed research publications on a variety of topics

KCU Featured Speaker - Dr. Bradley Creamer, MS., PhD.

Talk title: The MSSU-KCU Research Consortium (MKRC): Providing Unique Research Opportunities in the Four-State Region

Bio: Bradley Creamer, MS, PhD, is an Associate Professor of Physiology in the Department of Basic Science at Kansas City University. Dr. Creamer holds a BS from Washington State University in Animal Science, an MS from the University of Nebraska-Lincoln in Muscle Physiology, and a PhD in Cancer Biology from the University of Nebraska-Medical Center in Omaha. There he studied in the laboratory of Dr. Kay-Uwe Wagner where he focused on the initiation, progression, and survival of mammary tumors. In particular, he investigated the role of various signaling networks and their effects on the transformation, proliferation, survival, and development of drug resistance in human breast cancer. Dr. Creamer was involved in elucidating the role of the Janus Kinase 2 (JAK2) and Signal Transducer and Activator of Transcription (STAT5) pathway in mammary epithelial cell survival as well as identifying a novel splice variant of protein kinase B (AKT1), present only in the mammary gland that leads to increased survival of both normal and neoplastic cells. This research led him to join the laboratories of Dr. Harold Moses and Dr. Jennifer Pietenpol at Vanderbilt Medical Center and the Vanderbilt-Ingram Cancer Center as a Ruth L. Kirschstien National Research Service Award Postdoctoral Research Fellow. There he was involved in research investigating the p53 pathway in breast cancer, as well as identifying global gene signatures associated molecular subtypes of human breast cancer. In 2011 Dr. Creamer joined Missouri Southern State University as an Assistant Professor in the Department of Biology and Environmental Health, and in 2018 joined Kansas City University's Joplin Campus in the Department of Basic Science. He has worked closely with Dr. Jeff Staudinger and numerous KCU and MSSU students and colleagues to build and develop the MSSU-KCU Research Consortium (MKRC) and Biomedical Research Laboratory (BMRL) to provide opportunities for KCU and MSSU students and faculty, along with community partners, to participate in research in an effort to improve the well-being of the Joplin and four-state region. Dr. Creamer has worked along-side, published, and presented with numerous student-doctors and colleagues in the areas of medical education, OMT and stress-reduction, as well as investigating novel roles of the Pregnane X Receptor (PXR) in breast cancer progression in an effort to train the next generation of physician-scientists, and provide them with the skills and tools to remain life-long learners.