2016

PRECISION MEDICINE AND ENGINEERING: APPLICATIONS IN SEPSIS CARE SYMPOSIUM

Wednesday, May 4, 2016 | 7:30 a.m. - 2:15 p.m.

Pollard Auditorium | The Forum at Carle
611 W. Park St, Urbana, IL

The 2016 Precision Medicine and Engineering: Applications in Sepsis Care Symposium is sponsored by:

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HEALTH INNOVATIONS
A LECTURE SERIES SPONSORED BY IHSI & CARLE

OSF HEALTHCARE

Carle

SCHEDULE

7:30-8:00 a.m.	**Registration and Breakfast**
8:00-8:15 a.m.	**Welcome** **John Erdman** *Deputy Director, IHSI* **Matt Gibb** *Chief Medical Officer, Carle Foundation Hospital* **John Vozenilek** *Vice President and Chief Medical Officer, OSF Hospital and Jump Trading Simulation and Education Center*
8:15-8:45 a.m.	**Christopher Seymour**, University of Pittsburgh *Bedside Criteria for Sepsis in 2016: Sepsis-3*
8:45-9:15 a.m.	**Ephraim Tsalik**, Duke University Medical *CenterRedefining Sepsis Using Systems Biology*
9:15-9:45 a.m.	**Ilias Tagkopoulos**, University of California-Davis *Towards a Data-Centric Clinical Decision Support Tool for Sepsis*
9:45-10:00 a.m.	**Break**
10:00-10:30 a.m.	**Todd Rice**, Vanderbilt University *Sepsis: Diagnosis & Treatment in the Age of Emerging Informatics and Diagnostic Tools*
10:30-11:00 a.m.	**Alison Woodworth**, Vanderbilt University *A Collaborative Approach to Identification, Bio-Banking and Studying Patients with Sepsis—The Future of Laboratory Medicine*
11:00-11:30 a.m.	**John Vozenilek**, OSF & Jump Trading *Medical Simulation for Sepsis Care Training & Preperation*
11:30-12:00 p.m.	**Rashid Bashir**, University of Illinois *Lab-on-a-Chip and Microfluidics for POC Diagnostics*
12:00-12:45 p.m.	**Lunch**
12:45-1:15 p.m.	**Data Analytics for Sepsis** • **Shobha Vasudevan**, Illinois • **Lui Sha and Yu Jiang**, Illinois
1:15-2:15 p.m.	**Clinical Panel** **Moderator: Christopher Seymour** • **Karen White,** Carle • **James Kumar**, Carle • **Ben Davis**, Carle • **Andrew Vincent**, OSF Healthcare • **Leon Yeh**, OSF Healthcare • **Bhagat Aulakh**, OSF Healthcare
2:15 p.m.	**Symposium Concludes**

OPENING REMARKS

John Erdman
Deputy Director,
Interdisciplinary Health
Sciences Initiative

Matt Gibb
Chief Medical Officer,
Carle Foundation
Hospital

John Vozenilek
Vice President and Chief
Medical Officer, OSF Hospital
and Jump Trading Simulation

SPEAKERS

CHRISTOPHER SEYMOUR is an assistant professor of critical care and emergency medicine at the University of Pittsburgh School of Medicine. He is core faculty member in the Clinical Research, Investigation, and Systems Modeling of Acute Illness (CRISMA) Center. He is affiliated faculty in the Center for Research on Emergency Medical Services (CREMS) in the Center for Emergency Medical Services of Western Pennsylvania. He received his medical degree from the University of Pennsylvania before completing his internship and residency in Internal Medicine at the Hospital of the University of Pennsylvania. He then completed a fellowship in Pulmonary and Critical Care Medicine at the University of Washington, where he obtained a master's degree in clinical epidemiology at the University of Washington School of Public Health. His research program focuses on the organization of critical care during pre-hospital care—particularly the development of early diagnostic and prognostic models to facilitate allocation of patients and early treatments for those with acute illness. Specifically, he seeks to develop a research and acute care paradigm for pre-hospital sepsis similar that for acute cardiovascular disease.

Talk Title: Bedside Criteria for Sepsis in 2016: Sepsis-3

Abstract:

SPEAKERS

EPHRAIM TSALIK is an Assistant Professor of Medicine in the Center for Applied Genomics & Precision Medicine and the Division of Infectious Diseases at Duke University School of Medicine. He is also a Staff Physician in the Emergency Department Service Line of the Durham, VA Medical Center. Dr. Tsalik's research has focused on the development, evaluation, and promotion of diagnostics for acute infectious disease. In particular, he has made use of systems biology approaches to characterize the host response to infection, using these findings to drive the development of diagnostic and prognostic assays. Specific areas of interest include the differentiation of infectious from non-infectious disease; bacterial vs. viral infection; and using molecular data to redefine the sepsis syndrome. He also serves in the Antibacterial Resistance Leadership Group, where he interfaces with industry and academic partners to advance diagnostics development.

Talk Title: Redefining Sepsis Using Systems Biology

Abstract: Sepsis represents a heterogeneous syndrome driven by many permutations of host, pathogen, and their interface. This syndrome carries a high morbidity and mortality, which has been frustrated by the lack of diagnostic and therapeutic innovation. Elucidating the molecular processes that differ among sepsis patients may offer clues to the underlying heterogeneity, allowing for more refined endotyping whereby sepsis subclasses are identified. This understanding can then be used to stratify patients by underlying diagnosis, prognosis, and with potential therapeutic implications.

We examined the clinical features, the plasma metabolome, and the plasma proteome of patients with community-onset sepsis as well as patients with non-infectious illness. The metabolomes and proteomes of patients at the time of admission who would ultimately die differed markedly from those of patients who would survive. The different profiles of proteins and metabolites clustered into the following groups: fatty acid transport and beta oxidation, gluconeogenesis, and the citric acid cycle. They differed consistently among several sets of patients, and diverged more as death approached. In contrast, the metabolomes and proteomes of surviving patients with mild sepsis did not differ from survivors with severe sepsis or septic shock. These findings offer an alternative scheme to understand sepsis pathobiology, which can complement conventional sepsis clinical scoring systems.

SPEAKERS

ILIAS TAGKOPOULOS is a faculty member of the department of Computer Science and UC-Davis Genome Center. His interests span a variety of topics related to biology and engineering. He is particularly interested in the modeling, simulation and experimental validation of biological hypotheses regarding the emergence of microbial behaviors in complex environments, the effect of environmental correlation-structure to genotypic and phenotypic characteristics, and the design and implementation of computational tools, for synthetic and systems biology. Prior to joining UC-Davis he was a post-doctoral fellow in Princeton's Lewis-Sigler Institute for Integrative Genomics and a relationship manager in Credit Suisse's LOCuS fixed income derivatives group (DIT-SRA). He earned a Dipl.-Ing. in Electrical and Computer Engineering from University of Patras, a MSc in Microelectronics from Columbia University and a PhD in Electrical Engineering from Princeton University in 2001, 2003, and 2008, respectively.

Talk Title: Towards a Data-Centric Clinical Decision Support Tool for Sepsis

Abstract:

SPEAKERS

TODD RICE is is an Associate Professor of Medicine in the Division of Allergy, Pulmonary and Critical Care Medicine at Vanderbilt University. He completed his doctorate of medicine at Indiana University School of Medicine, where he stayed for Internal Medicine residency training. Dr. Rice was chosen to serve as a Chief Resident in Internal Medicine at the Indiana University School of Medicine. He then moved to Nashville, Tennessee where he completed Pulmonary and Critical Care Medicine fellowship training at Vanderbilt University. Following his fellowship, Dr. Rice joined the faculty in the Division of Allergy, Pulmonary, and Critical Care Medicine at Vanderbilt, where he serves as the director of the Medical ICU. As a physician scientist, he also continues to conduct clinical research in the ICU, including numerous studies in critically ill patients with sepsis. He currently has funding to investigate the role of citrulline in severe sepsis and is the Vanderbilt PI for the Prevention and Early Treatment of Acute Lung injury (PETAL) network. His research interests include sepsis, critical care nutrition, and acute lung injury, resulting in more than 70 publications and book chapters. Dr. Rice has delivered national and international lectures in sepsis, ARDS, and critical care nutrition.

Talk Title: Sepsis: Diagnosis and Treatment in the Age of Emerging Informatics and Diagnostic Tools

Abstract:

SPEAKERS

ALLISON WOODWORTH is an Associate Professor of Pathology, Microbiology and Immunology at Vanderbilt University Medical Center in Nashville, Tennessee, where she is also Director of Special Chemistry and Associate Director of Clinical Chemistry. She is a Diplomate of the American Board of Clinical Chemistry and currently serves as a director on the ABCC exam committee. She is the program director of the ComACC certified clinical chemistry fellowship program at Vanderbilt, where she also teaches residents, medical students and medical technologists. Her noteworthy contributions to clinical and translational research in the areas of sepsis, risk assessment, and maternal/fetal medicine have resulted in multiple publications and awards, including the NACB Distinguished Abstract Award and best abstract awards from the industry and maternal/fetal medicine division.

Talk Title: A Collaborative Approach to Identification, Bio-Banking and Studying Patients with Sepsis—The Future of Laboratory Medicine

Abstract:

SPEAKERS

JOHN VOZENILEK is the Director of Simulation and Chief Medical Officer of the Jump Trading Simulation and Education Center. Dr. Vozenilek provides central coordination and oversight for OSF Healthcare's undergraduate, graduate, interdisciplinary, and continuing medical education programs. Under his direction, the OSF Healthcare and the University Of Illinois College Of Medicine at Peoria have created additional organizational capabilities and infrastructure, building resources for educators who wish to use additional innovative learning technologies for teaching and assessment. As the Duane and Mary Cullinan Professor in Simulation Outcomes Dr. Vozenilek is actively involved in the academic programs across traditional departmental boundaries and in clinical practice at OSF Healthcare. In addition to his role in simulation, Dr. Vozenilek teaches master's degree candidates in the fields of simulation, healthcare quality and safety, and is formally appointed in the University of Illinois at Urbana-Champaign College of Engineering to teach biodesign.

Talk Title: Medical Simulation for Sepsis Care Training and Preperation

Abstract: Classically "medical simulation" has been the tool of educators at nursing and medical schools; teaching nursing students, medical students, and residents- occasionally providers in professional status. There is no doubt that this form of simulation has impact on patient care outcomes through a disciplined approach of experience, reflection, and adoption of new practices and mental models. What we propose is a shift in this paradigm, a shift to using simulation as a sensor. This sensor is a tool which can prospectively analyze the complex sociotechnical systems in the healthcare space. Jump investigators currently use medical simulation in situ- in the real clinical environments. This shift in focus transcends the use of the tool to educate, and moves healthcare to a new opportunity to create more resilient and reliable systems.

SPEAKERS

RASHID BASHIR completed his BSEE from Texas Tech University as the highest ranking graduate in the College of Engineering in Dec 1987. He completed his MSEE from Purdue University in 1989 and PhD from Purdue University in 1992. From Oct 1992 to Oct 1998, he worked at National Semiconductor in the Analog/Mixed Signal Process Technology Development Group where he was promoted to Sr. Engineering Manager. He joined Purdue University in Oct 1998 as Assistant Professor and was later promoted to Professor of Electrical and Computer Engineering and a Courtesy Professor of Biomedical Engineering and Mechanical Engineering. Since Oct 2007, he was the Abel Bliss Professor of Electrical and Computer Engineering & Bioengineering, Director of the Micro and NanoTechnology Laboratory (a campus wide clean room facility) at the University of Illinois, Urbana-Champaign, and Director of the campus-side Center for Nanoscale Science and Technology, a collaboratory aimed to facilitate center grants and large initiatives around campus in the area of nanotechnology. Since Oct. 2013 he has been the Department Head of Bioengineering. He has authored or co-authored over 190 journal papers, over 200 conference papers and conference abstracts, over 120 invited talks, and has been granted 37 patents. He is a fellow of IEEE, AIMBE, AAAS, AIMBE, and APS.

Talk Title: Lab-on-a-Chip and Microfluidics for POC Diagnostics

Abstract:

SPEAKERS

SHOBHA VASUDEVAN is an associate professor at the Electrical and Computer Engineering department at the University of Illinois at Urbana-Champaign. Her research interests are in system verification and security, analog and digital hardware validation, formal, static analysis and statistical algorithms, machine learning and causal inferencing in big data and biomedical device modeling. Her research software for automatic assertion generation, GoldMine, is being licensed by several companies including IBM, AMD, Qualcomm, Huawei Technologies, TI, Oracle, and is being developed by a leading EDA company into a commercial product. She is a technical consultant for several companies. She is the recipient of the Best Paper Award in DAC 2014, NSF CAREER award, the ACM SIGDA outstanding new faculty award, the Dean's Award for Excellence in Research, Best paper award in VLSI Design 2014, IEEE Council of EDA Early Career Award, the YWCA award for mentoring women and several best paper nominations. She has conceptualized and leads MyTri, an initiative for connecting women engineers from UIUC through a professional networking portal.

Talk Title: Data Analytics for Sepsis

Abstract:

SPEAKERS

LUI SHA graduated with a PhD from CMU in 1985. He is currently a Donald B. Gillies Chair Professor at the University of Illinois at Urbana-Champaign. His team's work on real-time and safety critical system integration has impacted many large scale high technology programs including GPS, Space Station, and Mars Pathfinder. His team is developing the technologies for Secure and Certifiable Multicore Avionics and Medical Best Practice Guidance Systems (Medical GPS). He is a co-recipient of IEEE Simon Ramo Medal, "for technical leadership and contributions to fundamental theory, practice and standardization for engineering of real time-systems", 2016. He has been appointed by NASA Administrator Bolden to NASA Advisory Council's Aeronautic Committee, 2015 to 2017. He was a member of National Academy of Science's Committee on Certifiably Dependable Software, 2005 to 2007. He is a fellow of IEEE and ACM.

YU JIANG got a PhD in computer science from Tsinghua University in 2015. He has received the Distinguished Dissertation Award of China Computer Federation. Currently, he is working with Prof. Lui Sha as a postdoc at the University of Illinois at Urbana-Champaign. His current research interests include formal modeling, verification and their applications in medical cyber physical systems.

Talk Title: An Early Warning System for Sepsis

Abstract: Sepsis is a leading cause of death globally, especially in the elderly and/or immune compromised population. Early detection of the onset of sepsis is known to be critical. However, checking every hospitalized patient with sepsis risk hourly is impractical.

We present a sepsis risk driven monitoring process. For example, the sepsis probability of an 87 years old patient with lung infection is 20 times higher than that of 67 years old patient without lung infection. Such information allows intelligent adjustment of the frequency and comprehensiveness of patient monitoring schedule.

The computation of a patient's sepsis risk is based on a novel Bayesian temporal probabilistic model, Auto-BN, which consists of time-dependent disease states and state dependent inference structures. Our approach can start with only age and known diseases. As more data become available, the quality of prediction improves. We plan to incorporate inflammatory biomarker data into our analysis because sepsis is systemic inflammation response to infection.

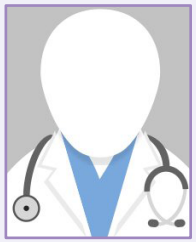
CLINICAL PANEL

DR. KAREN WHITE is an Intensivist at Carle Foundation Hospital in Urbana, IL. Before entering her medical career, she completed degrees in chemical engineering, including a doctorate degree in chemical engineering at The Pennsylvania State University. Dr. White is the Medical Director of the Intensive Care Unit at Carle, which encompasses neurocritical care, surgical and medical patients. She is collaborating with various researchers at University of IL in the areas of sepsis biomarkers, optical imaging of biofilms and development of novel documentation platforms for crisis situations.

DR. JAMES KUMAR is an Internal Medicine Hospitalist at the Carle Foundation Hospital in Urbana, IL. After completing his medical degree at the prestigious Madras Medical College (Chennai, India), Dr Kumar acquired a master's degree in molecular physiology at the University of Illinois. As an Assistant Professor with the University of Illinois, he has received several teaching awards and also served as an Associate Director for the Internal Medicine Residency Program. He currently the Director of Clinical Pathophysiology course at the UI College of Medicine, Urbana campus.

DR. BEN DAVIS has been at Carle and U of I since 2006. He is currently the Associate Medical Director of Emergency Medicine at Carle and a Clinical Assistant Professor in the Department of Surgery at the College of Medicine. He attended the Universi for undergrad, UIC for medical school and did his emergency medicine residency at Carolinas Medical Center in Charlotte, NC.

CLINICAL PANEL



ANDREW VINCENT is an.....

DR. LEON YEH is the Vice President and Chief Medical Officer of Emergency Services for OSF Healthcare. He also has the position of Medical Director of the Emergency Department of OSF Saint Francis Medical Center, a 90,000 annual visit Level 1 trauma center. He holds an MBA from University of Texas at Dallas. His professional interests are in emergency department operations and throughput management, physician engagement, and healthcare services access.

DR. BHAGAT AULAKH Is board certified in Internal Medicine, Pulmonary, Critical Care and Neurocritical Care. In addition to his duties as Medical Director of critical care at the Illinois Lung & Critical Care Institute, Dr. Aulakh shares his knowledge and experience as a faculty member at the University of Illinois College of Medicine at Peoria and medical director for OSF Saint Francis Medical Center's Critical Care departments. He is helping to develop curricula for the future Neurological Sciences Critical Care Department at OSF, has served as an advisor for the implementation of therapeutic hypothermia in the OSF ICU, and championed the development of numerous multidisciplinary lung cancer and COPD clinics.

PRECISION MEDICINE AND ENGINEERING: APPLICATIONS IN SEPSIS CARE SYMPOSIUM

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