

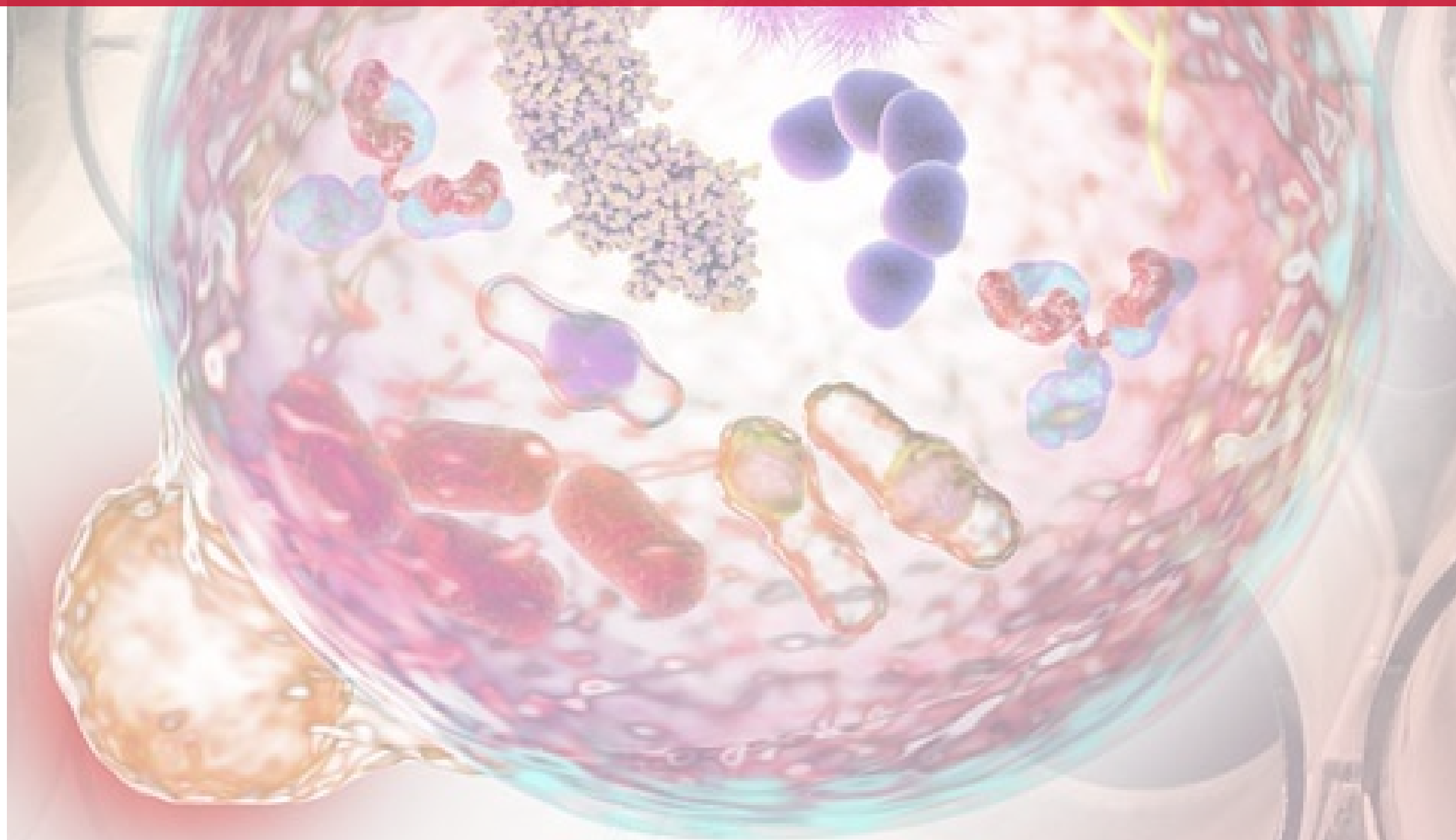


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19

22 NOVEMBER

10th Anniversary of STAR



# Our Mission

## Center for Shock, Trauma and Anesthesiology Research

The Shock, Trauma and Anesthesiology Research Organized Research Center (STAR-ORC) is a world-class, multi-disciplinary research and educational center focusing on trauma, critical care and organ support, resuscitation, surgical outcomes, injury prevention and peri-operative care.

Established in FY 2009, STAR includes the National Study Center for Trauma and Emergency Medical Systems and the multidisciplinary basic, translational, and clinical research programs within the Program in Trauma and the Department of Anesthesiology.

### Key Areas of Research

- Traumatic Brain Injury & Concussion, including Blast Injury
- Polytrauma and Sepsis
- Extracellular Vesicles (including Exosomes); Biomarkers and Therapeutics
- Bidirectional Brain, Systemic Interactions after Trauma (Lung, Immune and Gut)
- Predictive Bioanalytics for Critical Care and OR
- Spinal Cord Injury & Neurorepair
- Stroke & Parkinson's Disease
- Trauma Resuscitation
- Critical Care & Organ Support
- Post Traumatic Neuroinflammation, Neurodegeneration and Cognitive Decline
- Surgical Outcomes for Trauma and Critical Care
- Patient Safety & Injury Prevention

# STAR LEADERSHIP



**Alan I. Faden, MD**

Director, Center for Shock, Trauma and Anesthesiology Research (STAR)  
David S. Brown Professor in Trauma  
Professor, Departments of Anesthesiology, Anatomy & Neurobiology, Neurosurgery, Psychiatry and Neurology  
Associate Dean, Trans-Campus Research Advancement, School of Medicine



**Peter Rock, MD, MBA, FCCM**

Martin Helrich Professor and Chair  
Department of Anesthesiology  
Professor, Departments of Anesthesiology, Medicine and Surgery



**Thomas M. Scalea, MD, FACS, MCCM**

The Honorable Francis X. Kelly Distinguished Professor in Trauma  
Director, Program in Trauma  
Physician in Chief, R Adams Cowley Shock Trauma Center



**Rosemary Kozar, MD, PhD**

Associate Director, Center for Shock, Trauma and Anesthesiology Research (STAR)  
Professor, Department of Surgery  
Acting Director, Charles "McC" Mathias National Study Center for Trauma and EMS  
Director, Translational Research, Program in Trauma, R Adams Cowley Shock Trauma Center



**Wei Chao, MD, PhD, FAHA**

Associate Director, Center for Shock, Trauma and Anesthesiology Research (STAR)  
Anesthesiology Endowed Professor in Translational Research  
Director, Translational Research Program  
Vice-Chair for Translational Research  
Department of Anesthesiology

# Shock, Trauma and Anesthesiology Research (STAR) Center 10 Year Anniversary Symposium Agenda

8:30am-9:00am	<i>Registration with Coffee Service</i>
9:00am-9:15am	Introductions and Opening Remarks by Alan Faden, MD, Dean Albert Reece, MD, PhD, MBA, Thomas Scalea, MD, and Peter Rock, MD, MBA, FCCM
9:15am-9:30am	Alan Faden, MD, "STAR: 10 Year History"
9:30am-10:20am	Patrick Kochanek, MD, MCCM, "From Hypothermia to Rehabilitation: Targeting New Therapies for Traumatic Brain Injury and Cerebral Resuscitation"
10:20am-10:55am	<i>Break and Poster Session A</i>
10:55am-11:45am	Douglas Smith, MD, "Tackling Concussion and Its Aftermath"
11:45am-12:00pm	Rodney Ritzel, PhD, "The Immunopathology of Chronic Traumatic Brain Injury in Mice"
12:00pm-1:00pm	<i>Lunch and Poster Viewing</i>
1:00pm-1:15pm	Thomas Scalea, MD, and Mark Scarboro, "History of the National Study Center and its Evolution"
1:15pm-1:30pm	Chenfeng Xiong, PhD, "UMCP-UMB Transportation and Health Initiative: Big Data Sources, Integration, and Multidisciplinary Research"
1:30pm-2:20pm	Avery Tung, MD, "What's New in Sepsis in 2019"
2:20pm-2:35pm	Michael Mazzeffi, MD, MPH, "My Critical Care Research: Inspiration from Everyday Clinical Conundrums"
2:35pm-3:10pm	<i>Break and Poster Session B</i>
3:10pm-3:25pm	Sarah Murthi, MD, "Augmented and Virtual Reality in the Future of Medicine"
3:25pm-3:40pm	Jonathan Morrison, MB, ChB, PhD, "Exsanguination Cardiac Arrest: Opportunities for Future Intervention"
3:40pm-4:30pm	Timothy Billiar, MD, "What Large-scale 'OMICS' are Teaching Us About the Human Response to Injury"
4:30pm-4:45pm	Presentation of Poster Abstract Awards and Closing Remarks by Rosemary Kozar, MD, PhD, and Wei Chao, MD, PhD
4:45pm-6:00pm	<i>Closing Reception</i>



# Guest Speakers



**Patrick M. Kochanek, MD**

Ake N. Grenvik Professor and Vice Chair  
Department of Critical Care Medicine  
Professor, Department of Anesthesiology  
Director of the Safar Center for Resuscitation Research  
University of Pittsburgh School of Medicine

**Patrick M. Kochanek, MD** is Distinguished Professor of Critical Care Medicine, the Ake N. Grenvik the Professor and Vice Chair of Critical Care Medicine; Director of the Safar Center for Resuscitation Research; and Professor of Pediatrics, Anesthesiology, Bioengineering and Clinical and Translational Science at the University of Pittsburgh School of Medicine. As the Safar Center Director for 25 years, he has a long track-record of leading a translational and multi-departmental team studying traumatic and ischemic brain injury and neurointensive care, funded by the NIH, US Department of Defense, and the Laerdal Foundation. He has >540 listings on PubMed and was identified by ISI as the most prolific author in the field of TBI from 2001 to 2014. He is PI of Operation Brain Trauma Therapy for the U.S. Department of Defense and has been the PI for 19 years of a T-32 titled "Training in Pediatric Neurointensive Care and Resuscitation Research" funded by the NICHD. He has mentored numerous trainees, many of whom have gone on to receive independent funding and careers of national prominence. He is Editor-in-Chief of Pediatric Critical Care Medicine and is on the editorial board of numerous journals on acute brain injury. He received the Distinguished Investigator Award from the American College of Critical Care Medicine in 2007, was named one of the inaugural Masters of Critical Care Medicine, and received the Lifetime Achievement Award from the Society of Critical Care Medicine in 2017. He was also one of the distinguished speakers at the 125th anniversary celebration of Walter Reed Army Institute of Research in 2018 and gave a Great Teachers Lecture at the NIH Clinical Center in 2019.



**Douglas H. Smith, MD**

Robert A. Groff Professor and  
Vice Chair of Research and Education  
Department of Neurosurgery  
Director, Penn Center for Brain Injury and Repair  
University of Pennsylvania Perelman School of Medicine

**Douglas H. Smith, MD** is the Robert A. Groff Endowed Professor and Vice Chairman of Neurosurgery at the University of Pennsylvania. He also directs Penn's Center for Brain Injury and Repair, which includes over 30 faculty members and their research teams. In addition, Dr. Smith currently serves as the Scientific Director of the Big Ten- Ivy league Consortium on Concussion and he also serves as a member on the Scientific Advisory Boards of the US National Football League (NFL), the National Collegiate Athletic Association (NCAA)-DoD Grand Alliance, "Concussion Assessment, Research and Education" (CARE) Consortium and the International Concussion Society. For research efforts, Dr. Smith is Principal Investigator of several multi-center research programs on concussion and TBI-induced neurodegeneration. Dr. Smith also directs an NIH post-doctoral fellow training grant for brain injury. His group has established that damage to brain networks and specifically, diffuse axonal injury (DAI), represents key pathological process underlying concussion symptoms and that the extent of acute axonal pathology is predictive of cognitive outcome. In addition, his group has discovered mechanisms of concussion and more severe TBI that lead to progressive neurodegeneration, including chronic traumatic encephalopathy. These collective efforts are represented in over 250 published scientific reports with a h-index of over 80.

# Guest Speakers



**Timothy R. Billiar, MD**

George Vance Foster Professor and Chair  
Department of Surgery  
University of Pittsburgh School of Medicine

**Timothy Billiar, MD** is the George Vance Foster Professor and Chair for the Department of Surgery, Vice-President and Chief Academic Officer at the University of Pittsburgh Physicians and Associate Medical Director of UPMC International. Dr. Billiar received his undergraduate degree from Doane College in 1979 and a medical degree from the University of Chicago in 1983. He then completed training in general surgery at the University of Minnesota and the University of Pittsburgh. This included a four-year research training fellowship. In 1992, Dr. Billiar joined the faculty of the Department of Surgery at the University of Pittsburgh as a trauma surgeon. Since 1999, Dr. Billiar has served as Chair of the Department of Surgery at the University of Pittsburgh and the George Vance Foster Endowed Chair. Dr. Billiar has a long standing clinical and research interest in trauma, shock and sepsis. In research that has been funded by the National Institutes of Health since 1989, Dr. Billiar's laboratory has contributed to fundamental discoveries on the mechanisms leading to dysfunction of the immune system after injury or severe infection. His laboratory has also contributed to discoveries on the regulation and function of the inducible nitric oxide synthase. Dr. Billiar is past President of the Society of University Surgeons, the Nitric Oxide Society, the Surgical Infection Society, and the Shock Society, USA. In 2006, Dr. Billiar was inducted into the National Academy of Medicine, USA and in 2011 was named Distinguished Professor of Surgery at the University of Pittsburgh. He is also past recipient of the Flance-Karl Award and the Medallion for Scientific Achievement from the American Surgical Association and the Award for Scientific Achievement from the Shock Society. In 2016, he received the Friendship Award from the People's Republic of China and a Distinguished Service Award from the University of Chicago. In 2018, he was awarded the Jonathan E. Rhoads Medal from the American Philosophical Society and the Sheen Award from the American College of Surgeons.



**Avery Tung, MD**

Professor, Department of Anesthesia and Critical Care  
Director, Critical Care Services, Burn Unit  
Quality Chief, Anesthesia and Critical Care  
University of Chicago Pritzker School of Medicine

**Avery Tung, MD** is a Professor of Anesthesia and Critical Care, and Quality Chief for Anesthesia at the University of Chicago. Dr. Tung received his undergraduate degree from Harvard University in 1985, and a medical degree from the University of Chicago Pritzker School of Medicine in 1990. He did his internship and Anesthesiology residency at the University of California in San Francisco, and a fellowship in Critical Care at Stanford University. Dr. Tung joined the faculty at the University in Chicago in 1995. Dr. Tung has advanced certifications and licenses in Critical Care Medicine, Advanced Burn Life Support, Advanced Perioperative Transesophageal Echocardiography, and Critical Care Echocardiography. His research interests include: factors affecting physician decision-making, clinical topics in critical care medicine, and aspects of quality and safety in anesthesia and critical care. Dr. Tung is a member of the FDA CDRH General Hospital and Personal Use Devices Panel. He has been a member of the Society of Critical Care Anesthesiologists since 2002 and served as president from 2016 to 2018. He has been the Critical Care & Resuscitation section editor for Anesthesia & Analgesia since 2013. He was a member of the 2012 SCCM Guideline Task Force on Pain, Agitation and Delirium Management, and has served on the American Society of Anesthesiologists Guideline Task forces for Central Venous Access and Moderate Sedation. Dr. Tung is currently a member of the ASA Committee on Standards and Practice Parameters and of Performance Outcomes and Measurement. Dr. Tung is a distinguished guest lecturer and has been invited to speak at numerous institutions throughout the country. In 2013, he was the keynote speaker at the Intensive Care Society of Ireland, Dublin, where he presented, "The Price of Preference: Nonrational Factors in Medicinal Decision Making." Dr. Tung is a favorite among faculty and students at the Pritzker School of Medicine culminating in numerous honors. He was presented with an award from the Academy of Distinguished Medical Educators in 2011. In 2012, Dr. Tung was nominated as a fellow to the Society of Critical Care Medicine.



# School of Medicine Speakers



**E. Albert Reece, MD, PhD, MBA**  
Executive Vice President for Medical Affairs,  
UM Baltimore  
John Z. and Akiko K. Bowers Distinguished  
Professor  
Dean, School of Medicine

*Opening Remarks*



**Jonathan J. Morrison, MB, ChB, PhD**  
Assistant Professor  
Department of Surgery  
Vascular and Trauma Attending,  
Program in Trauma

*"Exsanguination Cardiac Arrest: Opportunities  
for Future Intervention"*



**Rodney Ritzel, PhD**  
Postdoctoral Fellow  
Department of Anesthesiology

*"The Immunopathy of Chronic Traumatic Brain  
Injury in Mice"*



**Chenfeng Xiong, PhD**  
Assistant Professor  
Civil and Environmental Engineering  
A. James Clark School of Engineering,  
University of Maryland College Park

*"UMCP-UMB Transportation and Health Initiative: Big  
Data Sources, Integration and Multidisciplinary  
Research"*



**Sarah B. Murthi, MD**  
Associate Professor  
Department of Surgery  
Co-Director, Maryland Blended Reality  
Center, Program in Trauma

*"Augmented and Virtual Reality in the Future  
of Medicine"*



**Thomas M. Scalea, MD, FACS, MCCM**  
The Honorable Francis X. Kelly Distinguished Professor  
in Trauma  
Director, Program in Trauma  
Physician in Chief, R Adams Cowley Shock Trauma  
Center

*"History of the National Study Center and its Evolution"*



**Michael A. Mazzeffi, MD, MPH**  
Associate Professor  
Department of Anesthesiology  
Chief, Division of Critical Care Anesthesiology

*"My Critical Care Research: Inspiration from  
Everyday Clinical Care Conundrums"*



**Mark Scarboro**  
Senior Director  
Research Operations and Compliance  
Center for Shock, Trauma, and Anesthesiology Research  
(STAR)

*"History of the National Study Center and its Evolution"*

**POSTER  
SESSION A**

**ATRIUM HALLWAY**

**10:20am-10:55am**

<b><u>Board</u></b>	<b><u>Author</u></b>	<b><u>Title</u></b>
<b>1</b>	Tuoxin Cao, PhD	SEXUAL DIVERGENT RESPONSES OF NEUROINFLAMMATION AND FUNCTIONAL RECOVERY TO SPINAL CORD INJURY
<b>2</b>	Harry M. C. Choi, PhD	SPATIAL AND TEMPORAL CHARACTERIZATION OF LC3+ AXONAL BULBS FORMED IN INJURED SPINAL CORD
<b>3</b>	Zachary Hannan, BS	MAINTENANCE OF REDUCTION IN SINGLE VS DUAL PLATING FOR EXTRA-ARTICULAR PROXIMAL THIRD TIBIAL SHAFT FRACTURES
<b>4</b>	Junyun He, PhD	THE VOLTAGE-GATED PROTON CHANNEL HV1 IMPAIRS RECOVERY AFTER TRAUMATIC BRAIN INJURY IN MOUSE THROUGH ALTERED MICROGLIA/MACROPHAGES RESPONSES
<b>5</b>	Peter Hu, PhD	IN FLIGHT EARLY DECISION MODEL PREDICTS THE NEED FOR CRITICAL ADMINISRRATION THRESHOLD (CAT) AND MASSIVE TRANSFUSION (MT) FOLLOING TRAUMA
<b>6</b>	Pratap Karki, PhD	TRUNCATED OXIDIZED PHOSPHOLIPIDS ARE CRITICAL FACTORS EXACERBATING ACUTE LUNG INJURY (ALI) IN THE AGING MICE
<b>7</b>	Yunbo Ke, PhD	IDENTIFICATION AND CHARACTERIZATION OF CIRCULATORY FACTORS RESPONSIBLE FOR TBI-INDUCED ENDOTHELIAL BARRIER DYSFUNCTION
<b>8</b>	Niaz Khan, BS	TIME-DEPENDENT CHANGES IN PLASMA EXTRACELLULAR VESICLES AFTER SPINAL CORD INJURY
<b>9</b>	Yun Li, PhD	DEPLETION OF Hv1 CHANNEL LIMITS TISSUE DAMAGE AND PROMOTES FUNCTIONAL RECOVERY AFTER SPINAL CORD INJURY IN MICE THROUGH REDUCED NOX2/ROS SIGNALING
<b>10</b>	Chia-Chen Liang, MS	COMPARISON OF MASSIVE AND EMERGENCY TRANSFUSION PREDICTION SCORING SYSTEMS WITH A NEW BLEEDING RISK INDEX SCORE IN A MILITARY RELEVANT POPULATION
<b>11</b>	Oleg Makarevich, BS	MITHRAMYCIN INHIBITS THE DNA DAMAGE-INDUCED ACTIVATION OF THE P53-DEPENDENT MITOCHONDRIAL INTRINSIC APOPTOSIS PATHWAY
<b>12</b>	Kamoltip Promnares, PhD	ROLE OF MICROTUBULE INSTABILITY IN HISTONE-INDUCED ENDOTHELIAL BARRIER DYSFUNCTION
<b>13</b>	Julia Thayer, PhD	USP24 REGULATES AUTOPHAGY THROUGH THE ULK1 AND TYPE III PI3-KINASE PATHWAY.

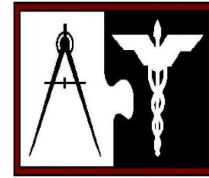


<u>Board</u>	<u>Author</u>	<u>Title</u>
14	Flaubert Tchantchou, PhD	AEROMEDICAL EVACUATION RELEVANT HYPOBARIA EXPOSURE INDUCED OXIDATIVE STRESS IN RATS WITH MILD TRAUMATIC BRAIN INJURY FACILITATES HOMOCYSTEINE TRANSULFURATION; A COMPENSATORY MECHANISM TO MITIGATE THE SECONDARY INJURY PROCESS
15	Amanda Hrdlick, BS	DELAYED HYPEROXIA FOLLOWING GLOBAL CEREBRAL ISCHEMIA IN RATS DOES NOT EXACERBATE NEURONAL DEATH IN THE HIPPOCAMPUS
16	Huang Huang, PhD	THE ROLE OF IRS2-AMPK AXIS SIGNALING IN HUMAN PULMONARY ARTERY SMOOTH MUSCLE CELL PROLIFERATION
17	Nina Klimova, PhD	NAD+ PRECURSOR INHIBITS ISCHEMIA-INDUCED CHANGES IN MITOCHONDRIAL PROTEIN ACETYLATION AND MITOCHONDRIAL SUPEROXIDE PRODUCTION
18	Yi-Mei Kuo, MS	STRESS TEST OF BLOOD TRANSFUSION ALGORITHM WITH A LARGE-SCALE CONTINUOUS TRAUMA PATIENT DATASET
19	Kerri Lopez, MD	EFFECT OF HYPOBARIC CONDITIONS ON CARDIAC DYSFUNCTION IN A MOUSE MODEL OF POLYTRAUMA
20	Juliana Medina, BS	EFFECTS OF AIR-EVACUATION-RELEVANT HYPOBA
21	Julie L. Proctor, MS	CEREBRAL BLOOD FLOW IS REDUCED DURING AEROMEDICAL EVACUATION-RELEVANT HYPOBARIA FOLLOWING RAT TRAUMATIC BRAIN INJURY
22	Briana K. Shimada, PhD	MIR-146A-5P MIMIC INDUCES CARDIAC INFLAMMATION AND DYSFUNCTION VIA TOLL-LIKE RECEPTOR 7
23	Sheng Wang, PhD	MICRO-RNA-146A: A DUAL REGULATOR OF INNATE IMMUNITY
24	Matthew Ward, PhD	PERFORMANCE OF TRAUMATIC BRAIN INJURY BIOMARKERS IN HIGH-RISK ELDERLY PATIENTS
25	Shiming Yang, PhD	A SURVEY STUDY OF REAL TIME VITAL SIGNS MONITOR SYSTEM BUSY HOSPITAL INTENSIVE CARE UNIT BEDSIDE
26	Yang Yang, PhD	SMALL RNA-SEQ ANALYSIS OF CIRCULATING PROINFLAMMATORY MICRO-RNA FOLLOWING MURINE MYOCARDIAL ISCHEMIA/REPERFUSION INJURY

**POSTER**  
**SESSION B**  
 ATRIUM HALLWAY  
 2:35pm-3:10pm

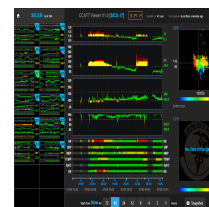
# Research Exhibits - Room T1R15 8:30am, 10:20am, 12:00pm, and 2:35pm

## The Crash Injury Research and Engineering Network (CIREN)



The Crash Injury Research and Engineering Network (CIREN) process combines prospective data collection with professional multidisciplinary analysis of medical and engineering evidence to determine injury causation in every crash investigation conducted. The mission of the CIREN is to improve the prevention, treatment, and rehabilitation of motor vehicle crash injuries to reduce deaths, disabilities, and human and economic costs. The current CIREN model utilizes two types of centers, medical and engineering. Medical centers are based at level one trauma centers that admit large numbers of people injured in motor vehicle crashes, such as the R Adams Cowley Shock Trauma Center at the University of Maryland. These teams are led by experienced trauma surgeons and emergency physicians. These teams also include trained crash investigators and a project coordinator. Engineering centers are based at academic engineering laboratories that have extensive experience in motor vehicle crash and human injury research. Engineering teams partner with trauma centers to enroll crash victims into the CIREN program. Engineering teams are led by highly experienced mechanical engineers typically trained in the area of biomechanics. Engineering teams also include trauma/emergency physicians, a crash investigator and a project coordinator. Either type of team typically includes additional physicians and/or engineers, epidemiologists, nurses and other researchers.

## Critical Care Air Transport Team Real-time Patient Status Viewer (CCATT Viewer)



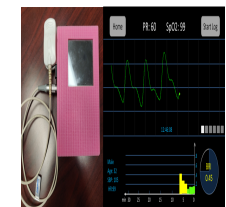
**Critical Care Air Transport Team Real-time Patient Status Viewer (CCATT Viewer)** is a novel display system that allows for remote monitoring of patients during transportation or ICU care. It allows clinicians to monitor and track patient vital signs trends and physiologic metrics, for increased situational awareness and prioritized care. The CCATT viewer displays multiple monitored patients as a group, using their VS trajectories. It uses highly distinguishable colors (green, yellow and red) to code normal, warning, and alert values. With a set of pre-defined and adjustable thresholds, abnormal VS above/below warning or alert thresholds are filled with yellow and red blocks to help rapidly identify patients who need attention. With longer VS trajectories (up to 72 hours) physiological patterns can be observed at a glance. During a 6-month follow-up study in the R Adams Cowley Shock Trauma Center, a survey has shown that the CCATT viewer could help clinicians to gather detailed information in a short amount of time and assist their decision making.

## The Shock, Trauma and Anesthesiology Research Center's (STAR) Clinical Research Team (CRT)



The Shock, Trauma and Anesthesiology Research Center's (STAR) Clinical Research Team (CRT) is a unique team based at the R Adams Cowley Shock Trauma Center dedicated to prospective research tasks on-site 24/7/365. The CRT is comprised of research nurses, study coordinators and research assistants. This real-time research team allows for faster interpretation of clinical data and identification of patients or patient conditions required as part of clinical research protocols. The CRT accomplishes this by way of the Research Management System (RMS), an Oracle based computer application developed by STAR. The RMS greatly enhances the efficiency of the CRT in screening over 6000 patients a year in Shock Trauma as well as the patients admitted to the CCRU/LRU, ED and ACES. The RMS also acts as a task scheduler to ensure the proper application of timing for each individual research protocol. Critical timings, such as sample collection, dispensing of medication, data collection, and automatic email alerts. The CRT is a core team within STAR, but also collaborates with other departments that require on-site 24-7 research services. Recently, CRT has worked with the following: Orthopaedics, Neurosurgery, Epidemiology and Nursing.

## Bleeding Risk Index (BRI)



**Bleeding Risk Index (BRI)** is an algorithmic index that uses data from pulse oximeter sensor to predict near future massive red blood cell use for trauma patients. It could be used to early identify occult or uncontrolled hemorrhage in both military and civilian trauma patients. Because the algorithm only relies on a single, light-weighted, non-invasive sensor, it can be deployed in a small mobile device or many existing medical monitoring devices and be used in the field. The algorithm was trained with advanced machine learning methods and multiple years trauma patients' high-fidelity physiologic data. It has been also tested retrospectively using more than 6000 cases and has achieved around 0.9 area under the Receiving Operating Curve (AUROC). This algorithm will be further tested using prospective data and multi-site data.



**10th Anniversary of STAR  
Friday, November 22, 2019  
Shock Trauma Auditorium**

**Continuing Medical Education Information**

**CME Sponsorship**

This educational activity is sponsored by the University of Maryland School of Medicine.

**Overview**

There are recent developments in clinical management limiting injuries and improving patient outcomes related to trauma and septic shock. Moreover, there are new treatment approaches for brain/spinal cord injuries. Healthcare providers are not aware of current management or treatment strategies in caring for trauma patients.

**Target Audience**

This educational activity is intended for Surgery, Anesthesiology, Emergency Medicine, Medicine, Anatomy Neurobiology, BioChemistry & Molecular Biology, Neurocritical Care Unit, Residents/Fellows/ Medical Students, Physician Assistants, Nurses and Nurse Practitioners.

**Learning Objectives**

At the conclusion of this activity, participants will be able to:

1. Identify current management strategies for traumatic brain injury (TBI), trauma resuscitation, and septic shock.
2. Describe the molecular and cellular mechanisms leading to tissue and organ injury induced by TBI, hemorrhagic shock, and septic shock.
3. Discuss the state-of-the art research in the field of trauma and sepsis.

**Accreditation**

The University of Maryland School of Medicine is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

**Credit Statement**

The University of Maryland School of Medicine designates this Live activity for a maximum of 6.0 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

## **Faculty Disclosure**

It is the policy of the University of Maryland School of Medicine to ensure balance, independence, objectivity, and scientific rigor in all of its educational activities. In accordance with this policy, all persons in a position to control the educational content of this activity must disclose any relevant financial relationships they have with commercial interests. Any identified conflicts of interest must be resolved prior to the speaker's presentation.

The following individuals have disclosed no relevant financial relationships with commercial interests:

- Timothy R. Billiar, MD
- Wei Chao, MD, PhD, FAHA
- Alan I. Faden, MD
- Patrick M. Kochanek, MD, MCCM
- Rosemary Kozar, MD
- Michael A. Mazzeffi, MD, MPH
- Jonathan Morrison, MB, ChB, PhD
- Sarah B. Murthi, MD
- E. Albert Reece, MD, PhD, MBA
- Rodney Ritzel, PhD
- Peter Rock, MD, MBA, FCCM
- Thomas M. Scalea, MD, FACS, MCCM
- Mark Scarboro
- Douglas H. Smith, MD
- Avery Tung, MD
- Chenfeng Xiong, PhD

**University of Maryland School of Medicine Office of CME staff members have disclosed no relevant financial relationships.**

## **Discussion of Off-Label or Investigational Uses**

Presentations in this continuing medical education activity may contain references to unlabeled or unapproved uses of drugs or devices. The audience is advised to consult the full prescribing information of all drugs or devices prior to use. Some drugs/devices identified during this activity may have United States Food and Drug Administration (FDA) clearance for specific purposes only or for use in restricted research settings. The FDA has stated that it is the responsibility of the prescribing health care professional to determine the FDA status of each drug or device that he/she wishes to use in clinical practice, and to use the products in compliance with applicable law.

UMSOM requires that all contributors disclose any unlabeled use or investigational use (not yet approved for any purpose) of pharmaceutical and medical device products and provide adequate scientific and clinical justification for such use. Physicians and other healthcare professionals are urged to fully review all the available data on products or procedures before using them to treat patients.

## **Disclaimer**

This CME activity is designed for use by healthcare professionals for educational purposes only. Information and opinions offered by the contributors represent their viewpoints. Conclusions drawn by the participant should be derived from careful consideration of all available scientific information. Prescription information and use of medical devices should be undertaken only after confirmation of information by consulting the FDA-approved uses and information.

While UMSOM makes every effort to have accurate information presented, no warranty, express or implied, is offered with respect to the information presented. Each participant should use his/her clinical judgment, knowledge, experience, and diagnostic decision-making before applying any information provided in this CME activity.



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# SPECIAL ACKNOWLEDGEMENTS:



UNIVERSITY  
OF MARYLAND  
MPOWERING  
THE STATE



A special thank you to the School of Medicine, Office of Public Affairs and Office of Faculty Affairs and Professional Development for their assistance in the planning and execution of this event.