Innovation Trends in Technologies for the Prevention, Treatment, and Management of Traumatic Brain Injury: A Workshop

Committee

Christina Master

Chair

Christina Master, MD is a Professor of Clinical Pediatrics at the University of Pennsylvania Perelman School of Medicine. Dr. Master is also a pediatric and adolescent primary care sports medicine specialist and an academic general pediatrician at the Children's Hospital of Philadelphia (CHOP). Additionally, she is the co-founding director of the Minds Matter Concussion Program, a CHOP Frontier Program which provides comprehensive cutting-edge and multi-disciplinary clinical care and rehabilitation for concussion, community advocacy and outreach. The Minds Matter Concussion Program also advances the field of concussion and mild traumatic brain injury in children, youth and young adults through translational clinical research. Her research focuses on visual deficits following concussion, its role in persistent post-concussive symptoms, its potential as a target for active intervention and treatment, and its usefulness as an objective physiological measure serving as a quantitative biomarker of injury and recovery. She is board-certified in Pediatrics, Sports Medicine, and Brain Injury Medicine, and is also an elected fellow of the American College of Sports Medicine. She treats over 800 children, youth and young adults with concussion annually in her clinical sports medicine practice while also continuing in her 28th year of general academic pediatric practice. She completed her undergraduate studies at Princeton University with an A.B. in Molecular Biology and graduated summa cum laude from the University at Buffalo School of Medicine and Biomedical Sciences. She completed pediatric residency training with an additional year as chief resident at CHOP. Subsequently, she completed a Sports Medicine fellowship at the Hospital of the University of Pennsylvania and went on to serve for 14 years as the Associate and Vice Program Director for the Pediatric Residency Program.

Kristy Arbogast

Member

Kristy Arbogast, PhD, is the scientific director for the Center for Injury Research and Prevention and the R. Anderson Pew Distinguished Chair of Pediatrics at Children's Hospital of Philadelphia. She is also a professor of Pediatrics at the University of Pennsylvania. Dr. Arbogast's research interests are pediatric injury biomechanics, injury causation and the effectiveness of safety products for children with a concentration in pediatric concussion and brain health, as well as the safety of children and youth in motor vehicle crashes. Dr. Arbogast served on the Institute of Medicine Committee on Sports Concussion in Youth and co-leads Children's Hospital's clinical research effort in concussions with a focus on the use of head impact sensors to understand the biomechanics, utilizing bioengineering technology for objective measures of concussion diagnosis and leveraging the electronic health record to define the natural history of concussions in children. She also co-leads an initiative for the National Football League and NFL Players Association to design and implement head impact sensors to understand the loading conditions in professional football with the goal of enhancing head protection through improvements in protective equipment. Dr. Arbogast earned their doctorate in Bioengineering at the University of Pennsylvania in 1997.

Ramon Diaz-Arrastia

Member

Ramon Diaz-Arrastia, MD, PhD, is a Professor of Neurology at the University of Pennsylvania, where he leads the TBI Clinical Research Initiative. His research interests are focused on understanding the molecular, cellular, and tissue-level mechanisms of neuronal injury and neuroregeneration, with the goal of developing neuroprotective and neuroregenerative therapies. Prior to coming to UPenn, he served as faculty at the University of Texas Southwestern, the Uniformed Services University of the Health Sciences, and the National Institute of Neurologic Disorders and Stroke (NINDS). Dr. Diaz-Arrastia has published over 250 primary research papers, as well as over 40 invited reviews and book chapters. He serves as a scientific advisory board member or scientific advisor for various health technology companies, including BrainBox Solutions, NovaSignal, NeurAegis, MesoScale Discoveries, and Ischemix, Inc. He has also served on several national committees related to traumatic brain injury, epilepsy, and dementia, convened by the National Institutes of Health, the Department of Defense, the Veterans Administration, and the National Academy of Medicine. Dr. Diaz-Arrastia received his MD and PhD from Baylor College of Medicine and completed post-graduate training at Harvard and Columbia.

Adam Ferguson

Member

Adam Ferguson, MS, PhD is a Professor of Neurosurgery at the University of California San Francisco, Director of Data Science in the Brain and Spinal Injury Center (BASIC) at the Zuckerberg San Francisco General Hospital, and Principal Investigator in the San Francisco VA Healthcare System. Their research interests are mechanistic neuroscience in model organisms to large-scale clinical data science and precision medicine research for TBI and SCI. Dr. Ferguson directs a diverse team of researchers performing a hybrid of bench neuroscience in the laboratory and translational data science, supported by grants from the NIH, VA, DARPA, and nonprofits. He has published over 200+ peer-reviewed scientific papers focusing on neuroscience and the role of big-data analytics for accelerating scientific discovery and healthcare decision-support. Dr. Ferguson serves as the President of the National Neurotrauma Society. Dr. Ferguson has also served as the founding Principal Investigator and co-director of the International Open Data Commons for Spinal Cord Injury and traumatic brain injury. Dr. Ferguson earned their doctorate degree in Psychology (Behavioral and Cellular Neuroscience) at Texas A&M University and completed a post-doctoral fellowship in Cellular and Molecular Neuroscience at the Ohio State University College of Medicine.

Cynthia Grossman

Member

Cynthia (Cyndi) Grossman, PhD is the former Head of Real-world Research Networks at Biogen Digital Health. Dr. Grossman has spent her career applying her social and behavioral science expertise transforming research programs to better address unmet health needs of patients and communities. She is an experienced leader across industry, government, non-profit and academia and is passionate about advancing better health outcomes for all through data and bringing the lived experience of patients into decision-making. Prior to Biogen, Dr. Grossman was Director Science of Patient Input at with the Milken Institute’s FasterCures initiative. Earlier in her career, she directed funding for HIV-related research programs at the National Institutes of Health (NIH). Dr. Grossman has received multiple grants and awards, including Phi Beta Kappa, and grants from NIH and Patient-Centered Outcomes Research Institute A(PCORI). She received her doctoral degree in clinical psychology from the University of Vermont, and completed a postdoctoral fellowship in pediatric clinical psychology at the Warren Alpert Medical School of Brown University.

Frederick Korley

Member

Frederick Korley, MD, PhD, is a Professor of Emergency Medicine and the Associate Chair for Research at the University of Michigan Emergency Department. He is the Scientific Director of Massey TBI Grand Challenge at the Weill Institute, University of Michigan. His research work is focused on the development of diagnostics and therapeutics for traumatic brain injury (TBI). He is a co-investigator of the largest observational study of TBI in the US (the Transforming Research and Clinical Knowledge in TBI, TRACK-TBI). In collaboration with colleagues in engineering, Dr. Korley is developing a credit card-sized microfluidic device for point-of-care measurement of TBI biofluid biomarkers. He is also a national principal investigator of two federally funded multi-center studies run by the Strategies to Innovate Emergency Clinical Care Trials (SIREN) network, that are investigating the use of biofluid-based biomarkers for subject selection in clinical trials and monitoring individual patient response to neuroprotective agents. With regards to the development of novel diagnostics, Dr. Korley has two patents for biofluid-based biomarkers for brain injury detection and outcome prognostication. In collaboration with colleagues in engineering, Dr. Korley is developing a credit card-sized microfluidic device for point-of-care measurement of TBI biofluid biomarkers.? He received his medical and emergency medicine education at Northwestern University School of Medicine (2003), and doctoral training in clinical investigation at the Johns Hopkins University School of Public Health with election to Phi Beta Kappa (2013).

Michelle LaPlaca

Member

Michelle LaPlaca, PhD is the Director of the Neurotrauma and Translational Bioengineering Laboratory at the Georgia Institute of Technology. She is also a Professor at the Wallce H. Coulter Department of Biomedical Engineering at the Georgia Institute of Technology and Emory University. Dr. LaPlaca’s research interests are in neurotrauma, injury biomechanics, and neuro-engineering as they relate to TBI. Her lab works to better understand acute injury mechanisms in order to develop strategies for neuroprotection, neural repair, and more sensitive diagnostics. Dr. LaPlaca and colleagues have developed and patented an abbreviated, objective clinical neuropsychological tool (Display Enhanced Testing for Cognitive Impairment and Traumatic Brain Injury, DETECT) to assess cognitive impairment associated with concussion and mild cognitive impairment. Dr. LaPlaca earned her PhD in Bioengineering from the University of Pennsylvania, followed by a postdoctoral fellowship at UPenn’s Department of Neurosurgery.

Geoffrey Shiu Fei Ling

Member

Geoffrey S. F. Ling, MD, PhD, is a medical doctor, TBI specialist, and retired United States Army colonel. He is a Professor of Neurology at the Uniformed Services University of the Health Sciences, where he serves as the founding director of the Neuro Trauma Laboratory. Here, his research team models and characterizes clinical phenotypes of explosive blast TBI and penetrating ballistic TBI to better characterize, mitigate, and treat these conditions. He is also a Professor of Neurology and Attending Physician in Neuro Critical Care at the Johns Hopkins Hospital. He also serves as the deputy director of the Defense Sciences Office. Previously, he served as the founding director of the Defense Advanced Research Projects Agency (DARPA) Biological Technologies Office.. As it relates to TBI, his research interests include the prevention of violent, explosive neurologic trauma. Dr. Ling is a recipient of the Humanitarian Award from the Brain Mapping Foundation. Dr. Ling earned his doctorate in pharmacology from Cornell University School of Medicine and an MD from Georgetown University School of Medicine He completed postdoctoral training in neuropharmacology at the Sloan-Kettering Memorial Cancer Center. Ling earned. Both his neurology internship and later residency were completed at Walter Reed Army Medical Center. Ling also completed a Neurosciences Critical Care Unit (NCCU) fellowship at Johns Hopkins University.

Christopher Loftus

Member

Christopher Loftus, MD is the Chief Medical Officer in the Division of Neurological and Physical Medicine Devices at the U.S. Food and Drug Administration. Dr. Loftus, who is board-certified in neurosurgery, is also the Professor of Neurosurgery at Temple University Lewis Katz School of Medicine. Dr. Loftus serves as the Vice President of the World Federation of Neurosurgical Societies. His research interests are instrument and device design, hemostasis and anticoagulation, and regulatory matters at the FDA level. Dr. Loftus earned their medical degree from SUNY-Downstate Medical Center, and then did their Residency in Neurosurgery at the Neurological Institute of New York, Columbia-Presbyterian Medical Center in New York, NY.

Luca Marinelli

Member

Luca Marinelli, PhD, is Senior Principal Scientist at GE HealthCare, Technology & Innovation Center. During his time at GE, Dr. Marinelli has led the clinical research study part of the GE/NFL Head Health Initiative, a partnership between GE and National Football League on Traumatic Brain Injury. He is currently co-PI on the GE-MIT performing team for DARPA Measuring Biological Aptitude, a study focused on biological drivers of human performance. His research interests are quantitative MRI, fast MRI imaging, and advanced algorithms for accelerated image acquisition and reconstruction, including the development of early compressed sensing applications to MRI, and diffusion imaging in the brain. Dr. Marinelli is a co-author on over100 journal publications, book chapters, and conference proceedings. Dr. Marinelli also serves on the scientific advisory board of the ALS Finding a Cure Foundation. Dr. Marinelli completed a PhD in Physics at Harvard University, after which he completed a postdoctoral fellowship in Information Theory and Wireless Telecommunications at Bell-Laboratories-Lucent Technologies.

Travis Polk

Member

Captain Travis Polk, MD has served as the Director of the Combat Casualty Care Research Program since July 2020. As Director of the Combat Casualty Care Research Program and Chair of the Joint Program Committee-6, CAPT Polk is responsible for the strategic planning and management of the DoD science and technology investment that supports the development of knowledge and material solutions for combat-related trauma on the current and future battlefield. In this role, he exercises primary planning, programming, budgeting and execution of the integrated Combat Casualty Care research portfolio for the Defense Health Program and US Army (approximately $150 million in FY21), including programs in Neurotrauma, Prolonged Care, Severe Burns, En Route Care, Battlefield Resuscitation of Combat Casualties, Medical Photonics, Medical Simulation, and Medical Assist Support Technologies. CAPT Polk received his Bachelor of Science in Nursing from Norwich University in 1997 and his Doctor of Medicine from the Uniformed Services University in 2001. He completed his general surgery training at Naval Medical Center Portsmouth in 2008 and a fellowship in traumatology, surgical critical care and emergency surgery at the University of Pennsylvania in 2012. He is an Assistant Professor of Surgery at the Uniformed Services University and is board certified in general surgery with an added qualification in surgical critical care. CAPT Polk’s personal awards include the Meritorious Service Medal (five awards), the Navy Commendation Medal (two awards), and Surface Warfare Medical Department Officer qualification device.

Leslie Prichep

Member

Leslie Prichep, PhD, is the Chief Scientific Officer of BrainScope, a medical device neurotechnology company. Here, she directs research and algorithm development efforts that use machine learning to identify scientifically-validated biomarkers of traumatic brain injury and concussion. Dr. Prichep's research interests are in quantitative electrophysiology, clinically applied translational research, source localization, and multivariate classification methodology. Throughout her career, her focus on quantitative electrophysiology and translational research has been applied to several brain-related disease states including traumatic brain injury, dementia, addiction, depression, pain, and schizophrenia. Dr. Prichep has successfully led programs integrating objective measures of brain function into commercially available medical devices, from concept through FDA clearance, for several applications. Dr. Prichep has led the BrainScope team to eight FDA clearances, and eight Department of Defense research contracts for product development, substantially adding to the company's patent portfolio. Previously, Dr. Prichep was the Director of the Brain Research Laboratories (BRL) and a Professor of Psychiatry at the New York University School of Medicine, where she remains a professor in retirement. At BRL, Dr. Prichep and her colleagues were the first to publish normative equations demonstrating that features of the EEG could be were lawful as a function of age.?She has published in over 130 peer-reviewed journals, with another 55 book chapters, books, published proceedings and monographs to her name. In 2019, she was elected as a Fellow to the National Academy of Inventors.

Katherine Bowman

Staff Officer