

Understanding Brain-Body Interactions to Advance Brain Health: A Workshop

Committee

Katja Brose

Co-Chair

Katja Brose, PhD, is a Science Program Officer at the Chan Zuckerberg Initiative. The goals of Chan Zuckerberg Science Initiative are to support basic science and technology that will make it possible to cure, prevent, or manage all diseases by the end of the century. Before joining CZI, she was part of the editorial team at Cell Press for 17 years, where from 2004-20017 she was Editor-in-Chief of Neuron and a Publishing Director at Cell Press-Elsevier. During her tenure as Editor, Neuron undertook a major expansion of its scope building on its historical strengths in molecular and cellular neuroscience to cover all areas of neuroscience from molecular/cellular mechanisms to systems and cognitive neuroscience, genetics, neurological and psychiatric disease, theoretical neuroscience and emerging technologies. As Publishing Director, she was responsible for Cell Press strategy for review content, including oversight of the Trends family of review journals. She also led Cell Press' efforts around rigor and reproducibility.

She has been an active committee member at the Society for Neuroscience, as a member of the Professional Development and Neuroscience Training Committees. She speaks frequently on topics related to scientific publishing and communication, including publication ethics and rigor and reproducibility in science. She earned her undergraduate degree in 1990 from Brown University, with a double concentration in Biology and European History. She received her PhD in Biochemistry from the University of California-San Francisco (1994-2000). For her graduate work, she worked in the laboratory of Dr. Marc Tessier Lavigne focusing on axon guidance mechanisms in the developing spinal cord.

Sharyn Rossi

Co-Chair

Sharyn Rossi, PhD, is the director of neuroscience programs at BrightFocus Foundation. Dr. Rossi received her PhD in anatomy and neurobiology from the University of California, Irvine, where she studied stem cell replacement therapies for the treatment of spinal cord injury. She continued her post-doctoral work at A.I. duPont Hospital for Children studying spinal muscular atrophy, and Johns Hopkins University, using optogenetics to investigate how transplanted stem cells integrate into brain circuitry after traumatic brain injury.

Before joining BrightFocus Foundation, Dr. Rossi was a senior research scientist at the National Institute on Aging, using neuroimaging, light-sheet microscopy, and novel interventions to investigate changes in the brain during normal cognitive aging.

At BrightFocus, she uses her multidisciplinary background in central nervous system injury and mechanisms of aging to implement research initiatives, initiate and maintain institutional collaborations, and foster relationships with scientists and key stakeholders, while overseeing an active portfolio of more than \$45 million consisting of 167 grants spanning 14 countries.

Olujimi Ajijola

Member

Olujimi Ajijola, M.D., Ph.D., studies the peripheral neural circuits that regulate the heart, utilizing cutting edge electrophysiologic, genetic, optical, and computational tools to examine how cardiac injury structurally and functionally perturbs the nervous system, and how this dysregulation drives arrhythmogenesis and sudden cardiac death risk. Clinically, he is an interventional cardiac electrophysiologist with expertise in a broad range of heart rhythm disorders.

Dr. Ajijola received his B.A. with Distinction from the University of Virginia, his medical degree from Duke University, and his Ph.D. in Molecular, Cellular, and Integrative Physiology from UCLA as part of the STAR program. His clinical training in internal medicine and Cardiology/Cardiac Electrophysiology were performed at the Massachusetts General Hospital and at UCLA, respectively. He is also an alumnus of the National Academies' New Voices Program, a recipient of the NIH Director's New Innovator Award (DP2), the Jeremiah Stamler Young Investigator Award and received the 2023 Sir Burdon Sanderson Prize Lecture Award from the University of Oxford. He was elected to the American Society for Clinical Investigation in 2023 and currently serves as an elected Councilor. He is currently a sitting member of the National Academies' Roundtable on Black Men and Women in Science, Engineering, and Medicine. He is a nationally recognized advocate for medical and physician-scientist training, recently receiving a Chan Zuckerberg Award for these efforts.

Katerina Akassoglou

Member

Katerina Akassoglou, Ph.D., has pioneered studies in the investigation of neurovascular and neuroimmune mechanisms in neurologic diseases, and in particular the role of the blood clotting factors in CNS autoimmunity, trauma, and neurodegeneration. Her aim is to understand the mechanisms that control the communication between the brain, immune and vascular systems with the ultimate goal to design novel therapies for neurologic diseases—and in particular, multiple sclerosis and neurodegenerative diseases.

Dr. Akassoglou identified blood clotting factors as major mediators of neurologic disease. She made the unanticipated discovery that the blood clotting factor fibrinogen is a key activator of microglia in the CNS. She developed novel imaging tools to study the neurovascular interface and therapeutic strategies to protect from neuroimmune diseases by blocking the damaging effects of blood factors in the brain without affecting their beneficial effects in blood clotting. Dr. Akassoglou takes a multifaceted approach to her research, incorporating animal modeling, in vivo two-photon microscopy, drug discovery, preclinical translational research, and biomarker studies. Dr. Akassoglou has published over 100 papers in peer-reviewed journals and she is active in several national and international organizations, editorial boards, and funding agencies.

Dr. Akassoglou has received several awards, including the Presidential Early Career Award for Scientists and Engineers, the highest honor bestowed by the US government on outstanding scientists and engineers beginning their independent careers. She has also been presented with the John J. Abel Award, the Dana Foundation for Brain and Immunoimaging Award, the Vilcek Prize for Creative Promise honor, The Marilyn Hilton Award for Innovation in Multiple Sclerosis Research, the EUREKA and R35 Research Program Award by NINDS, the Barancik Prize for Innovation in MS Research and the ISFP Prize. She was elected Lifetime fellow of the American Association for the Advancement of Sciences (AAAS) and fellow of the National Academy of Inventors (NAI).

Dr. Akassoglou earned a BSc degree in biology and a PhD in neurobiology at the University of Athens, Greece. She was trained in neuropathology at the University of Vienna before performing her postdoctoral work at the Rockefeller University, and New York University. She started her laboratory as an Assistant Professor at the Department of Pharmacology at the University of California, San Diego where she was promoted to Associate Professor with tenure. She is now a Senior Investigator at the Gladstone Institute of Neurological Disease, and a Professor in the Department of Neurology at the University of California, San Francisco. She is also the founder and Director of the Gladstone Center for In Vivo Imaging Research.

Diane Bovenkamp

Member

Diane Bovenkamp, PhD, Vice President of Scientific Affairs, is the chief scientist at BrightFocus Foundation, overseeing global operations of the organization's research programs. She serves as the scientific liaison in local, national, and international forums, and identifies and develops new research initiatives, partnerships, and funding policies consistent with the mission of BrightFocus.

Dr. Bovenkamp obtained her PhD in Biochemistry from Queen's University in Kingston, Ontario, Canada, discovering and studying Eph receptors in angiogenesis and neural development in zebrafish and mice. She completed a Postdoctoral Fellowship in the Vascular Biology Program at Boston Children's Hospital/Harvard Medical School, isolating and characterizing zebrafish neuropilins. Dr. Bovenkamp conducted further research at the Johns Hopkins University Bayview Proteomics Center in the Division of Cardiology at Johns Hopkins School of Medicine in Baltimore, Maryland, using proteomic techniques for biomarker detection in human serum.

Merit Cudkowicz

Member

Merit Cudkowicz, M.D., MSc is the inaugural Executive Director of the Mass General Brigham Neuroscience Institute, Former Chair of Neurology and current Director of the Sean M. Healey & AMG Center for ALS at Mass General Hospital and the Julieanne Dorn Professor of Neurology at Harvard Medical School. Dr. Cudkowicz is one of the founders and former co-directors of the Northeast ALS Consortium (NEALS), a group of over 150 clinical sites in the United States, Canada, Europe and the Middle East dedicated to performing collaborative academic-led clinical trials and research studies in ALS. She is leading the first Platform Trial initiative in ALS and is also the Principal Investigator of the Clinical Coordination Center for the National Institute of Neurological Disorders and Stroke's Neurology Network of Excellence in Clinical Trials (NeuroNEXT). Dr. Cudkowicz provides mentorship to physicians globally in careers in experimental therapeutics

Viviana Gradinaru

Member

Viviana Gradinaru, Ph.D., is a physicist-turned-neuroscientist and engineer of proteins and viruses, motivated by a desire to understand the brain and to act upon that understanding to improve human health. As a neurotechnologist with >15 years of experience, Dr. Gradinaru and her group have developed methods that enable functional and anatomical access to the vertebrate nervous system, such as tools for readout and control of neural activity, tissue clearing and imaging, and gene-delivery vectors. They have used learnings from distinct fields (neuroscience, protein engineering, and data science) to overcome some of the biggest challenges in optogenetics and gene delivery, developing microbial opsins that are tolerated by mammalian cells (e.g. eNpHR3.0, highly used worldwide) and viral capsids capable of crossing the blood-brain barrier in adult mammals (e.g. AAV-PHP.eB, now used by hundreds of groups worldwide and growing). Her group has disseminated new opsins, viruses, and protocols for gene delivery and tissue clearing into the research community (corresponding author on: Treweek et al, Nature Protocols, 2015; Deverman et al, Nature Biotechnology, 2016; Chan et al, Nature Neuroscience, 2017; Challis et al, Nature Protocols, 2019; Bedbrook et al, Nature Methods, 2019; Kumar et al, Nature Methods, 2020). They have also used many of these novel technologies to better understand circuits underlying locomotion, reward, and sleep (Gradinaru et al, Science, 2009; Xiao et al, Neuron, 2016; Cho et al, Neuron, 2017; Oikonomou et al, Neuron, 2019; Challis et al, Nature Neuroscience, 2020). Going forward, Dr. Gradinaru's goal is to enable high-precision, minimally-invasive study and repair of diseased nervous systems across species, by developing a deep mechanistic understanding of viral capsids and the rules governing transport across the blood-brain barrier, and leveraging this knowledge to engineer ideal vehicles for gene delivery to the brain via the vasculature.

Dr. Gradinaru is very active in training and service, notably as faculty director of the Beckman Institute CLOVER (CLARITY, Optogenetics and Vector Engineering Resource) Center, which provides training and access to the group's reagents and methods. They promptly disseminate their tools/reagents and know-how to the broader community for use, improvement, and scientific discovery (Addgene Blue Flame Award 4x; training workshops at Stanford, CSHL, U. Michigan, and Caltech; >100 publications, ~30k citations, h-index 65).

Dr. Gradinaru has received many honors and awards, including the NIH Director's Innovator and Pioneer Awards, the Presidential Early Career Award for Scientists and Engineers, outstanding young investigator awards from the American Society of Gene and Cell Therapy and the Society for Neuroscience, the Innovators in Science Award in Neuroscience from Takeda and the New York Academy of Sciences, the Gill Transformative Investigator Award, the Science Magazine & PINS Prize for Neuromodulation, the Vilcek Prize for Creative Promise in Biomedical Science, and the Great Immigrants Award from the Carnegie Corporation of New York. Dr. Gradinaru is a Sloan Fellow, Pew Scholar, Moore Inventor, Vallee Scholar, World Economic Forum Young Scientist, and a Fellow of both the National Academy of Inventors and the American Association for the Advancement of Science (AAAS).

Keith Hengen

Member

Keith B. Hengen, Ph.D., is Associate Professor in the Department of Biology at Washington University in St. Louis, where he previously served as Assistant Professor since 2017. Before joining Washington University, he completed postdoctoral training at Brandeis University in the laboratory of Gina Turrigiano.

Dr. Hengen's research focuses on homeostatic regulation of neural circuits, criticality in neural systems, and the relationship between sleep and brain function. His laboratory employs in vivo electrophysiology in freely behaving animals to understand how neural circuits maintain stable function while adapting to changing conditions, with applications to neurodevelopmental disorders and neurodegenerative diseases. He has made significant contributions to understanding how sleep restores optimal computational regimes in cortical networks and how neuronal firing rates are homeostatically regulated.

Dr. Hengen has received numerous honors, including the J.T. Tai Foundation Alzheimer's Disease Research Award, recognition as a Next Generation Leader at the Allen Institute for Brain Science, and the NIH Pathway to Independence Award (K99/R00). He earned his Ph.D. in Neuroscience from the University of Wisconsin, Madison, and his B.A. in Biological Psychology from Bates College.

Rima Kaddurah-Daouk

Member

Rima Kaddurah-Daouk, Ph.D., is a graduate of the American University of Beirut Department of Biochemistry with subsequent training at Johns Hopkins (worked with Nobel Laureate Hamilton Smith), Massachusetts General Hospital and the Massachusetts Institute of Technology. She has been a seminal force in the development of applications of metabolomics in the medical field. She co-founded the Metabolomics Society and served more than four years as its founding president, helping create a presence and voice for an interactive metabolomics community. She co-founded Metabolon, a leading biotechnology company for applications in metabolomics, and two other biotechnology companies. With significant NIH funding (over 45 grants funded past 15 years), she established and leads large consortia (more than 120 scientists from over 30 academic institutions). The ADMC, funded by the National Institute on Aging (NIA) and in partnership with the Alzheimer's Disease Neuroimaging Initiative (ADNI), is one of six consortia under the Accelerating Medicines Partnership for Treatment of AD (AMP-AD) initiative set to respond to President Obama's challenge: "National Plan to Address Alzheimer's Disease" to treat or prevent AD by 2025. The consortium is mapping metabolic failures across the trajectory of AD connecting peripheral and central changes, defining genetic basis for metabolic alterations and molecular basis for resilience during aging. The NIMH-funded Mood Disorder Precision Medicine Consortium (MDPMC) seeks to optimize treatment outcomes in depression (in partnership with the Mayo Clinic, Emory, NESDA, Rotterdam, Max Planck and several other institutions). The Alzheimer Gut Microbiome Project (AGMP), an initiative that she leads with Dr. Sarkis Mazmanian and Rob Knight is defining the influences of gut bacteria on brain metabolic health and influences of diet and life style on gut brain interactions. She also leads an exposome consortium that is part of recently launched NIA Tri Exposome initiative for Alzheimer disease. Earlier work funded by the National Institute of General Medical Sciences (NIGMS) through the Pharmacometabolomics Research Network established foundations for a new field "Pharmacometabolomics", which parallels and informs pharmacogenomics and in which metabolic profiles of individuals are used to inform about treatment outcomes. This consortium established foundations for use of metabolomics data as a complement for genomics data in precision medicine approaches.

Dr. Kaddurah-Daouk leads several initiatives and task groups in Precision Medicine. She has over 220 peer reviewed scientific publications, leads a large number of active NIH grants and has more than 60 patents or patent applications. She is an inventor on a series of patents on use of metabolomics for the diagnosis and treatment of neuropsychiatric diseases. In 2018, she ranked as the highest funded researcher in departments of psychiatry nationally (Blue Ridge Institute for Medical Research) and continues to be among the top funded researchers in the field of psychiatry.

Two decades of her research has established foundations for the study of neuropsychiatric diseases as chronic metabolic diseases and where chemical exposome diet life style and gut microbiome all contribute to brain metabolic health. These peripheral central connections and findings of consortia she leads has started to transform our understanding of these brain diseases with a focus on modifiable factors that can impact disease and progression.

Walter J. Koroshetz

Member

Walter Koroshetz, M.D., was selected Director of the National Institute of Neurological Disorders and Stroke (NINDS) on June 11, 2015. Dr. Koroshetz joined NINDS in 2007 as Deputy Director, and he served as Acting Director from October 2014 through June 2015. Previously, he served as Deputy Director of NINDS under Dr. Story Landis. Together, they directed program planning and budgeting, and oversaw the scientific and administrative functions of the Institute. He has held leadership roles in a number of NIH and NINDS programs including the NIH's BRAIN Initiative, the Traumatic Brain Injury Center collaborative effort between the NIH intramural program and the Uniformed Health Services University, and the multi-year work to develop and establish the NIH Office of Emergency Care Research to coordinate NIH emergency care research and research training.

Before joining NINDS, Dr. Koroshetz served as vice chair of the neurology service and director of stroke and neurointensive care services at Massachusetts General Hospital (MGH). He was professor of Neurology at Harvard Medical School (HMS) and led neurology resident training at MGH between 1990 and 2007. Over that same period, he co-directed the HMS Neurobiology of Disease Course with Drs. Edward Kravitz and Robert H Brown.

A native of Brooklyn, New York, Dr. Koroshetz graduated from Georgetown University and received his medical degree from the University of Chicago. He trained in internal medicine at the University of Chicago and Massachusetts General Hospital. Dr. Koroshetz trained in neurology at MGH, after which he did post-doctoral studies in cellular neurophysiology at MGH with Dr. David Corey, and later at the Harvard neurobiology department with Dr. Edward Furshpan, studying mechanisms of excitotoxicity and neuroprotection. He joined the neurology staff, first in the Huntington's Disease (HD) unit, followed by the stroke and neurointensive care service. A major focus of his clinical research career was to develop measures in patients that reflect the underlying biology of their conditions. With the MGH team he discovered increased brain lactate in HD patients using MR spectroscopy. He helped the team to pioneer the use of diffusion/perfusion-weighted MR imaging and CT angiography/perfusion imaging in acute stroke, which is now widely employed in medical practice.

Active in the American Academy of Neurology Dr. Koroshetz chaired the professional organization's Public Information Committee, led the AAN's efforts to establish acute stroke therapy.

Kevin Kwok

Member

Kevin Kwok, Pharm.D., has worked in the biopharma industry for more than 20 years across a wide range of roles. Fifteen years ago, he was diagnosed with Young Onset Parkinson's Disease when he was 48 years old. This combination of professional and lived experience gives him a unique perspective in his patient advocacy. Dr. Kwok serves on many advisory and steering committees for patient groups, the biopharmaceutical companies and academic researchers. He earned his doctor of pharmacy degree in 1986 from the University of Michigan.