NATIONAL Sciences Engineering Medicine

Forum on Neuroscience and Nervous System Disorders Board on Behavioral, Cognitive, and Sensory Sciences

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

October 22, 2025 | 11:00am-3:00pm ET | Virtual October 23, 2025 | 11:00am-3:00pm ET | Virtual

ATTENDEE PACKET



Forum on Neuroscience and Nervous System Disorders Board on Behavioral, Cognitive, and Sensory Sciences

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Understanding Brain-Body Interactions to Advance Brain Health

A Virtual Workshop

Wednesday, October 22, 2025: 11:00 am – 3:00 pm ET Thursday, October 23, 2025: 11:00 am – 3:00 pm ET

Objectives

- Highlight case studies that document the state of science on brain-body interactions between the central nervous system, peripheral nervous system, and other organ systems.
- Examine current tools and technologies available to study brain-body connections and how large-scale data collection efforts, data science, and artificial intelligence, can contribute to advancing research.
- Explore the implications of brain-body interactions for therapeutic development including clinical trial design and endpoints.
- Discuss what factors (e.g., interdisciplinary research, increased awareness, and workforce training) may be needed to facilitate a paradigm shift that considers the interconnectedness of the brain and body systems in clinical diagnosis, prognosis, and treatment.

Program At-A-Glance

Day 1 (October 22)

Welcome & Introductory Remarks

Workshop Overview

Keynote Presentation

Session 1: Mechanistic Axes of Brain-Body Communication

Part A: Organ Systems

Part B: Molecular Messengers and Systemic Signals

Concluding Remarks

Day 2 (October 23)

Welcome & Day 1 Recap

Session 2: Emerging Technologies and Model Systems

Session 3: Translating Science into Action

Session 4: Workshop Reflections & Potential Directions Moving Forward

Concluding Remarks



WEDNESDAY, OCTOBER 22, 2025

11:00am Introductory Remarks

Frances Jensen, University of Pennsylvania; Forum on Neuroscience and Nervous System Disorders Co-chair

Deanna Barch, Washington University in St. Louis; Forum on Neuroscience and Nervous System Disorders Co-chair

11:05am Workshop Overview

Katja Brose, Science Advisor, Workshop Co-chair

Sharyn Rossi, BrightFocus Foundation, Workshop Co-chair

11:10am Keynote Presentations

Kevin Kwok, Davis Phinney Foundation for Parkinson's; *Planning Committee Member* Emeran Mayer, University of California, Los Angeles

11:40am Audience Q&A for Keynote Presentation

Diane Bovenkamp, BrightFocus Foundation; Planning Committee Member

11:50am Session 1: Mechanistic Axes of Brain-Body Communication

Objective: Explore the integrative neural, hormonal, immune, and autonomic mechanisms by which the brain monitors, coordinates, and regulates internal bodily states across organ systems, and to examine how disruptions in these pathways contribute to dysfunction in behavior, cognition, and overall physiological health.

PART A: Organ Systems

Key Discussion Questions:

- How do neural circuits involved in interoception enable the brain to sense and regulate internal bodily states across organ systems?
- What are the mechanisms by which the brain exerts control over whole-body states such as sleep, arousal, and circadian rhythms?
- How do autonomic pathways—including sympathetic, parasympathetic, and vagal circuits coordinate organ function, and what are the consequences of their dysregulation?
- In what ways do neuromodulators like serotonin and dopamine act as systemic regulators, influencing both brain function and peripheral physiology?

11:50am Overview

Katja Brose, Science Advisor, Workshop Co-Chair

Speaker Presentations

11:55am Olujimi Ajijola, University of California, Los Angeles; *Planning Committee Member*

Xin Sun, University of California, San Diego

Asya Rolls, Tel Aviv University



12:40pm Moderated Panel and Audience Q&A

1:15pm BREAK

PART B: Molecular Messengers and Systemic Signals

Key Discussion Questions:

- How do immune and endocrine signals influence brain function, and what are the mechanisms of bidirectional communication across the brain-immune and gut-brain axes?
- What roles do molecular messengers—such as cytokines, hormones, and metabolites—play in modulating neural activity, behavior, and cognition?
- How does hypothalamic regulation integrate metabolic and hormonal cues (e.g., leptin, GLP-1) to maintain energy balance, and what happens when these systems break down?
- In what ways do vascular and inflammatory pathways contribute to neural health or dysfunction, and how can we disentangle causality in these complex interactions?

1:25pm Overview

Katerina Akassoglou, Gladstone Institutes, University of California, San Francisco; *Planning Committee Member*

1:30pm Speaker Presentations

Costantino Iadecola, Weill Cornell Medicine Tony Wyss-Coray, Stanford University Ana Domingos, Oxford University

2:15pm Moderated Panel and Audience Q&A

2:50pm Day 1 Concluding Remarks

Katja Brose, Science Advisor, Workshop Co-chair

Sharyn Rossi, BrightFocus Foundation, Workshop Co-chair

3:00pm Adjourn Day 1



THURSDAY, OCTOBER 23, 2025

11:00am Review of Day 1 and Preview of Day 2

Katja Brose, Science Advisor, Workshop Co-chair

Sharyn Rossi, BrightFocus Foundation, Workshop Co-chair

11:05am Session 2: Emerging Technologies and Model Systems

Objective: Explore emerging technologies and computational approaches that enable deeper understanding and modulation of brain-body circuits, with an emphasis on cross-tissue resolution, translational potential, and implementation challenges.

Key Discussion Questions:

- How are novel tools—such as multi-omic profiling, brain-organ imaging, and neuromodulation—reshaping the field's ability to study brain-body interactions at cellular and circuit levels?
- What are the opportunities and limitations of using digital phenotyping and wearable devices to capture dynamic, real-world brain-body states?
- How can computational modeling, theory, and artificial intelligence help bridge across biological scales and data modalities to generate testable hypotheses about systemic brain-body regulation?

11:05am Session Overview

Keith Hengen, Washington University in St. Louis; *Planning Committee Member*

11:10am Speaker Presentations

Woodrow Shew, University of Arkansas

Polina Anikeeva, Massachusetts Institute of Technology

Viviana Gradinaru, California Institute of Technology; Planning Committee Member

11:55am Moderated Panel and Audience Q&A

12:35pm BREAK

12:45pm Session 3: Translating Science into Action

Objective: Examine how a more holistic understanding of brain-body interactions might reshape neuroscience research, therapeutic strategies, and public health approaches—while addressing health disparities and elevating patient-centered perspectives.

Key Discussion Questions:

- What mechanisms can support cross-sector and cross-disciplinary collaboration to advance this work?
- How can lived experience and patient perspectives inform the identification of research priorities, study design, and development of interventions?
- How do social and environmental conditions—such as stress, diet, and pollution—shape brainbody health outcomes, and how can these influences be better incorporated into research frameworks?
- What strategies are most effective in translating insights about brain-body interactions into equitable healthcare and public health interventions?



12:45pm Session Overview

Merit Cudkowicz, Massachusetts General Hospital; Harvard Medical School; *Planning Committee Member*

12:50pm Speaker Presentations

Rima Kaddurah-Daouk, Duke University; Planning Committee Member Nikki Schultek, AlzPI; Philadelphia College of Osteopathic Medicine; Intracell Research Group Kevin Sheth, Yale University

1:35pm Moderated Panel and Audience Q&A

2:10pm Session 4: Workshop Reflections & Potential Directions Moving Forward

Objective: Reflect on the key themes highlighted throughout the workshop and consider future research questions, gaps, and opportunities needed to move the field forward.

Key Discussion Questions:

- What factors (e.g., interdisciplinary research, increased awareness, and workforce training) may be needed to facilitate a paradigm shift that considers the interconnectedness of the brain and body systems in clinical diagnosis, prognosis, and treatment.
- How might computational and Al-based approaches accelerate discovery in this space?

2:10pm Session Overview

Katja Brose, Science Advisor, *Workshop Co-chair* Sharyn Rossi, BrightFocus Foundation, *Workshop Co-chair*

2:15pm Themes & Future Opportunities Discussion

Nicole Rust, University of Pennsylvania Peter Lansbury, Harvard Medical School; Lysosomal Therapeutics, Inc. Julie Harris, Allen Institute

2:55pm Concluding Remarks

Katja Brose, Science Advisor, Workshop Co-chair Sharyn Rossi, BrightFocus Foundation, Workshop Co-chair

3:00pm Adjourn Day 2

Forum on Neuroscience and Nervous System Disorders

The Forum on Neuroscience and Nervous System Disorders was established in 2006 to provide a venue for building partnerships, addressing challenges, and highlighting emerging issues related to brain disorders, which are common, major causes of premature mortality, and, in aggregate, the largest cause of disability worldwide. The Forum's meetings bring together leaders from government, industry, academia, disease advocacy organizations, philanthropic foundations, and other interested parties to examine significant—and sometimes contentious—issues concerning scientific opportunities, priority setting, and policies related to research on neuroscience and brain disorders; the development, regulation, and use of interventions for the nervous system; and related ethical, legal, and social implications.

Forum members meet several times a year to exchange information, ideas, and differing perspectives. The Forum also sponsors workshops (symposia), workshop proceedings, and commissioned papers as additional mechanisms for informing its membership, other stakeholders, and the public about emerging issues and matters deserving scrutiny. Additional information is available at www.nas.edu/NeuroForum.

MEMBERS

Frances Jensen, MD, co-chair University of Pennsylvania

Deanna Barch, PhD, co-chair Washington University in St.

Bruce Bebo, PhD
National Multiple Sclerosis

Andrea Beckel-Mitchener, PhD National Institute of Mental

Health

Diane Bovenkamp, PhDBrightFocus Foundation

Katja Brose, PhD Science Advisor

Teresa Buracchio, MDFood and Drug Administration

Sarah Caddick, PhD
Gatsby Charitable Foundation

Rosa Canet-Avilés, PhD
California Institute for
Regenerative Medicine (CIRM)

Michael Chiang, MD National Eye Institute

Merit Cudkowicz, MD, MSc Massachusetts General Hospital; Harvard Medical School Beverly Davidson, PhD

Children's Hospital of Philadelphia

M. Denise Dearing, Ph.D National Science Foundation

Nita Farahany, JD, PhDDuke University

Eva L. Feldman, MD, PhD University of Michigan

Brian Fiske, PhD
The Michael J. Fox Foundar

The Michael J. Fox Foundation for Parkinson's Research

Magali Haas, MD, PhD, MSE Cohen Veterans Bioscience

H.E. Hinson, MD American Academy of Neurology

Richard Hodes, MD National Institute on Aging

Stuart W. Hoffman, PhDDepartment of Veterans Affairs

Yasmin Hurd, PhD Icahn School of Medicine at Mount Sinai

Michael I. Hutton, PhD Eli Lilly **Steven E. Hyman, MD**Broad Institute of MIT and Harvard

Michael Irizarry, MD Eisai

Sahib Khalsa, MD, PhD
American College of
Neuropsychopharmacology

George Koob, PhD
National Institute on Alcohol
Abuse and Alcoholism

Walter Koroshetz, MD
National Institute of Neurological
Disorders and Stroke

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John Krystal, MD, Yale University

Robert C. Malenka, MD, PhD Stanford University

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Oxford University; Yale University;
UK Government Mental Health Mission

Bill Martin, PhDJanssen Research & Development

David McMullen, M.D.Food and Drug Administration

Forum on Neuroscience and Nervous System Disorders
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Dana Foundation

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University of California, Davis

John J. Ngai, PhD

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Foundation for the National Institutes of Health

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Allen Institute

Marsie Ross, PharmD

Harmony Biosciences

Katie Sale, BA

American Brain Coalition

Raymond Sanchez, MD

Bain Capital Life Sciences

Terrence Sejnowski, PhD

Salk Institute for Biological

Studies

Joan Sereno, PhD

National Science Foundation

Sara Shnider, PhD, MSc

One Mind

David Shurtleff, PhD

National Center for

Complementary and Integrative

Health

John Spiro, PhD

Simons Foundation

Nora D. Volkow, MD

National Institute on Drug Abuse

Christopher Weber, PhD

Alzheimer's Association

Doug Williamson, MBChB, MRCPsych

Independent Consultant

Richard Woychik, PhD

National Institute of

Environmental Health Sciences

Stevin Zorn, PhD

MindImmune Therapeutics

Forum Staff

Sheena Posey Norris, MS, PMP

Director, Forum on Neuroscience and Nervous System Disorders

Ashley Pitt, BA

Senior Program Assistant

Clare Stroud, PhD

Senior Program Director

Biomedical and Health Sciences

Recent Events

Applying Neurobiological Insights on Stress to Foster Resilience Across the Lifespan (March 24-25, 2025) A collaboration with the Forum on Mental Health and Substance Use Disorders

<u>Unraveling the Neurobiology of Empathy and Compassion: Implications for Treatments for Brain Disorders and Other Applications</u> (May 19 & 21, 2025) *A collaboration with the Board on Behavioral, Cognitive, and Sensory Sciences*

Approaches to Address Unmet Research Needs in Traumatic Brain Injury Among Older Adults (2024) A collaboration with the Forum on Traumatic Brain Injury

Examining Glucagon-Like Peptide-1 (GLP-1R) Agonists for Central Nervous System Disorders (2024)

Exploring the Bidirectional Relationship between Artificial Intelligence and Neuroscience (2024)

Exploring the Adoption of Implantable Brain Stimulation into Standard of Care for Central Nervous System Disorders: A Workshop (2023)

<u>Toward a Common Research Agenda in Infection-Associated Chronic Illnesses: A Workshop to Examine</u>

Common, Overlapping Clinical and Biological Factors (2023) A collaboration with the Forum on Microbial Threats

<u>Multimodal Biomarkers for Central Nervous System Disorders: Development, Integration, and Clinical Utility:</u>

A Workshop (2023)

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Sponsors & Organizations Represented on the Forum on Neuroscience and Nervous System Disorders

GOVERNMENT

California Institute for Regenerative Medicine

Department of Veterans Affairs Food and Drug Administration

National Center for Complementary and

Integrative Health National Eye Institute

National Institute of Environmental Health

Sciences

National Institute of Mental Health

National Institute of Neurological Disorders and

National Institute on Aging

National Institute on Alcohol Abuse and

Alcoholism

National Institute on Drug Abuse

National Institutes of Health BRAIN Initiative

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Alzheimer's Association **American Brain Coalition** BrightFocus® Foundation Cohen Veterans Bioscience

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Foundation for the National Institutes of Health Michael J. Fox Foundation for Parkinson's Research

National Multiple Sclerosis Society

Paul G. Allen Frontiers Group

Simons Foundation Autism Research Initiative

PRIVATE FOUNDATIONS

Gatsby Charitable Foundation

PROFESSIONAL SOCIETIES

American Academy of Neurology American College of Neuropsychopharmacology American Neurological Association Society for Neuroscience

Biosketches of Speakers

Polina Anikeeva, Ph.D.



Polina Anikeeva, Ph.D., received her B.S. in Physics from St. Petersburg State Polytechnic University, and a Ph.D. in Materials Science and Engineering from MIT. She completed her postdoctoral training at Stanford, where she created devices for optical stimulation and recording from brain circuits. She joined MIT faculty in 2011 and is currently Matoula S. Salapatas Professor and the Department Head of Materials Science and Engineering. She is also a Professor of Brain and Cognitive Sciences and serves as the Director of the K. Lisa Yang Brain-Body Center and as an Associate Director of the Research Laboratory of Electronics. She is an associate member of the McGovern Institute for Brain Research. Dr. Anikeeva's Bioelectronics group focuses on the development of minimally invasive biologically inspired approaches to record and modulate physiology of the nervous system, and especially in the context of brain-body communication. Dr. Anikeeva is a recipient of NSF CAREER Award, DARPA Young Faculty Award, the TR35, Vilcek Prize for Creative Promise, and the NIH Pioneer Award.

Ana Domingos, Ph.D.



Ana I. Domingos, Ph.D., is a Professor of Neuroscience at the University of Oxford. Her laboratory discovered the sympathetic neuro-adipose axis mediating leptin's lipolytic effects, providing the first visualization of adipose sympathetic neurons essential for fat mass reduction via norepinephrine signaling. Her team identified Sympathetic neuron-Associated Macrophages (SAMs), contributing to obesity by metabolizing norepinephrine, findings that inspired the development of sympathofacilitators—a novel class of peripheral anti-obesity drugs free from central nervous system side effects. Dr. Domingos' research focuses on the pharmacological regulation of autonomic functions to combat obesity safely, pioneering the emerging field of Neuroimmunometabolism. Her group has extensively reviewed this field (Nature Reviews Endocrinology, Annual Review of Cell and Developmental Biology, Neuron) and organized dedicated conferences, including the Keystone Symposium (2022). Dr. Domingos serves as editor-in-chief of the American Journal of Physiology - Endocrinology and Metabolism and holds editorial roles at Cell Metabolism and eLife. Her numerous accolades include the EMBO Installation Award, Human Frontiers Science Program Award, Howard Hughes Medical Institute-Wellcome International Scholar Award, ERC-Consolidator Award, Pfizer Aspire Obesity Award, Carl Ludwig Lectureship, BBSRC Grant, and NIH Opportunity Pool Award, among others. She has been invited to speak at over 70 international conferences.

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Julie Harris, Ph.D.



Julie Harris, Ph.D., is the Vice President of The Paul G. Allen Frontiers Group. In this role, she leads efforts to identify bold research at the very frontiers of bioscience with the potential to reshape our fundamental understanding of biology. Julie's professional background spans science philanthropy, non-profit organizations, biotech, and academic science sectors. She was previously Executive Vice President of Research Management at the Cure Alzheimer's

Fund. In that role, Julie managed a dynamic grant portfolio in support of the most promising science and scientists working to end the burden of Alzheimer's disease. Julie was also the Vice President of Preclinical Biology at Cajal Neuroscience, a Seattle biotech startup focused on identifying therapies for neurodegenerative diseases. For nearly a decade, she worked at the Allen Institute for Brain Science as a scientist and Associate Director of Neuroanatomy, where she played pivotal roles building several of the Institute's signature open science resources, including the Allen Mouse Brain Connectivity Atlas. She received a B.S. in Zoology from Michigan State University, a Ph.D. in Neurobiology and Behavior from the University of Washington, postdoctoral training at the Gladstone Institute of Neurological Disease, and has > 50 peer-reviewed publications to her name.

Email: julie.harris@alleninstitute.org

Constantino ladecola, M.D.



Costantino ladecola, M.D., is the Director and Chair of the Feil Family Brain and Mind Research Institute at Weill Cornell Medicine, New York, NY. A pioneer in neurovascular unit research, he has advanced our understanding of neurovascular dysfunction in neurodegenerative diseases, and the role of immunity and microbiota in stroke. With over 450 publications, he is listed among Clarivate Analytics' "Highly Cited Researchers" and has received numerous awards, including the American Heart Association's Basic Science Prize and the Lifetime Achievement Award from the International Society for Cerebral Blood Flow and Metabolism.

Email: coi2001@med.cornell.edu

Peter Lansbury, Jr., Ph.D.



Peter T. Lansbury, Jr., PhD, received his AB (cum laude) in chemistry from Princeton University in 1980 and subsequently received his PhD in organic chemistry from Harvard University in 1985 under the direction of Nobel laureate E. J. Corey. His postdoctoral fellowship was spent at the Rockefeller University, working with the late Tom Kaiser. In 1988, he accepted a position as assistant professor of chemistry at MIT and was promoted to associate professor in 1993.

He moved to his current position at the Center of Neurologic Diseases in 1996 and was promoted to professor of neurology at Harvard Medical School in 2004. During this time, he founded the Laboratory for Drug Discovery in Neurodegeneration and the Morris K. Udall NIH Parkinson's Disease Research Center of Excellence at Brigham and Women's Hospital, which he directed for 10 years. He was the founder of Link Medicine and served as its chief scientific officer from 2005 until its sale to AstraZeneca in 2012 to Bial Pharma. He and his team developed a brain-penetrant, safe, and well-tolerated glucocerebrosidase allosteric activator for the treatment of GBA1-PD, a genetic subtype of Parkinson's disease, currently in phase 2 clinical trials. Dr. Lansbury has recently founded CeraLink Therapeutics to develop a therapeutic for other subtypes of Parkinson's disease.

Emeran Mayer, M.D.



Emeran A Mayer, M.D., is a Gastroenterologist, Neuroscientist, and Distinguished Research Professor in the Department of Medicine at the David Geffen School of Medicine at UCLA, the Executive Director of the G. Oppenheimer Center for Neurobiology of Stress & Resilience, Co-Director of the UCLA Specialized Center of Research Excellence (SCORE) on Sex Differences and Founding Director of the Goodman Luskin Microbiome Center at UCLA. He has published 430 scientific papers, co edited 3 books and has an h-index of 133. Dr. Mayer published the best selling books: The Mind Gut Connection in 2016, The Gut Immune Connection in June 2021, and the recipe book Interconnected Plates in 2023. In 2023, he produced and directed a documentary film for PBS on the mind gut immune connection and was featured in a piece by MasterClass.com on Gut Health.

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Asya Rolls, Ph.D.



Asya Rolls, Ph.D., is a faculty member in the Department of Life Sciences at Tel Aviv University and a visiting professor at the Technion – Israel Institute of Technology. Her research explores how the brain regulates the immune system and how mental states influence the body's capacity to cope with disease. Professor Rolls has received multiple ERC grants (Starting, Consolidator, and Proof of Concept), was elected an EMBO Member in 2024, and was among 40 international researchers selected as a Howard Hughes Medical Institute (HHMI) Investigator in collaboration with the Wellcome Trust (2018-2023).

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Nicole C. Rust, Ph.D.



Nicole C. Rust, Ph.D., is a professor in the Department of Psychology at the University of Pennsylvania in Philadelphia. She received her B.S. in molecular biology from the University of Idaho, her Ph.D. in Neural Science from New York University, and she completed her postdoctoral training at the Massachusetts Institute of Technology. Nicole's research focuses on understanding the brain's remarkable ability to remember the things we've seen ("visual memory") and what drives the mysterious feeling we call "mood". Nicole's research has been recognized by multiple awards, including the Troland Research Award from the National Academy of Sciences. She is currently on fellowship as a Simons Foundation Pivot Fellow. Nicole is also the author of the 2025 book Elusive Cures: Why Neuroscience Hasn't Solved Brain Disorders — and How We Can Change That.

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Nikki M. Schultek, B.S.



Nikki Schultek received her B.S. in Business Administration from Villanova University, studying Marketing, French and International Business. She began her career in the life sciences industry with Pfizer and Genentech. Shortly after accepting her most treasured role, "mom", Nikki fell systemically ill, including frightening neurodegenerative symptoms. After being diagnosed with Borrelia burgdorferi (Lyme Disease), Chlamydia pneumoniae and other co-infections and receiving antibiotic therapy, she experienced remission. Nikki is accelerating innovation in Infection Associated Chronic Conditions and Illnesses (IACCI), such as Alzheimer's Disease,

Asthma, and others by building interdisciplinary research collaborations. In 2017 she Founded Intracell Research Group, LLC, to unite researchers, clinicians, and stakeholders across the globe. Nikki is a collaboration architect, Co-Founder and Executive Director of The Alzheimer's Pathobiome Initiative, Founding Director of a NEW Pathobiome Research Center at the Philadelphia College of Osteopathic Medicine (PCOM) a co-investigator of a 3,200-patient asthma clinical trial (iTREAT-PC) and member of the Board of Directors of the International Lyme and Associated Diseases Education Foundation. To date, Schultek has raised funding to launch AlzPI research at 8 academic centers and generate preliminary data using the roadmap she co-lead authored, published in Alzheimer's and Dementia: The Journal of the Alzheimer's Association (Lathe, Schultek, Balin et al., 2023), detailing an actionable, scientifically rigorous plan to unveil the potential role of microbial infections in dementia and other brain diseases.

Email: nikki@intracellresearchgroup.com

Kevin N. Sheth, M.D.



Kevin Sheth, M.D., is recognized for his leadership in prevention, acute treatment, and recovery stroke research. He has led and developed highly innovative programs in drug development, translation, and medical devices. He is a winner of the Robert Siekert Award from the American Heart Association (AHA), the Derek Denny Brown Award from the American Neurological Association and an elected member of the American Society for Clinical Investigation (ASCI) and the Association of American Physicians (AAP). He has received the Stroke Mentorship Award from the American Heart Association (AHA). Dr. Sheth has formed exciting partnerships with entrepreneurs, pharmaceutical companies, and medical device start-ups to bring forward highly innovative solutions. As a leader in brain health and cerebrovascular science, his teams deployed the first FDA-approved solution for portable magnetic resonance imaging, led the first translational trials to prevent brain swelling after stroke, and conducted groundbreaking randomized studies in brain hemorrhage survivors, transforming care and outcomes. Overall, the principal theme of his efforts are towards collaboration and an improved understanding of neurological disease.

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Woodrow Shew, Ph.D.



Woodrow Shew, Ph.D., is a Professor of Physics at the University of Arkansas. The overarching theme and goal of his research over the past two decades has been to discern the general principles of how the brain computes – how cognition, perception, and behavior emerge from the coordinated dynamics of large populations of neurons. Since starting his own lab in 2012, his group meets this goal by performing behavioral and electrophysiological experiments, computational modeling, and developing fundamental mathematical theory. His lab's expertise is in high-density multi-electrode recordings combined with precise high-dimensional body motion tracking, and innovative data analysis. This research started in 2006 during his neuroscience postdoctoral training at NIH, but rests firmly on a rigorous foundation of experimental and theoretical study of complex dynamical systems begun during his physics PhD work at University of Maryland. Most notably, his work has advanced basic understanding of the critical brain hypothesis, bringing fundamental physics theory to bear on how the brain works.

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Xin Sun, Ph.D.



Xin Sun, Ph.D., received her Ph.D. in Biology from Yale University. She is currently the Nancy Olmsted Chair and Professor of Pediatrics and Professor of Cell and Developmental Biology at University of California at San Diego. The Sun laboratory investigates body brain crosstalk with the lung as the organ of focus. Building on their long-term focus on the lung and the finding that pulmonary neuroendocrine cells are rare sensory cell types in lung that relay signal to the nervous system, her team started the line of work to consider the lung as a sensory organ. They have systematically mapped lung innervating neurons and nerves, and their connection to the brainstem. Their current research focuses on mapping the specificity of lung-brainlung complete circuits in response to diverse signals in both physiological and pathological settings.

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Tony Wyss-Coray, Ph.D.



Tony Wyss-Coray, Ph.D., is the D.H. Chen Distinguished Professor of Neurology and Neurological Sciences and the Director of the Phil and Penny Knight Initiative for Brain Resilience at Stanford University. His lab studies brain aging and neurodegeneration with a focus on age-related cognitive decline and Alzheimer's disease. The Wyss-Coray research team discovered that circulatory blood factors can modulate brain structure and function and factors from young organisms can rejuvenate old brains. Current studies focus on the molecular basis of the systemic communication with the brain by employing a combination of genetic, cell biology, and –omics approaches in mice, and humans. Dr. Wyss-Coray has presented his ideas at Global TED, the Tencent WE Summit, the World Economic Forum, and he was voted Time Magazine's "The Health Care 50" most influential people transforming health care in 2018. He co-founded Alkahest Inc. and several other companies targeting Alzheimer's and neurodegeneration; he is a AAAS Fellow and has been the recipient of an NIH Director's Pioneer Award, a Zenith Award from the Alzheimer's Association, and a NOMIS Foundation Award.

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Biosketches of Planning Committee Members

Katja Brose, **Ph.D**.
Planning Committee Co-Chair



Katja Brose, Ph.D., is a former 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 2004-2017 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, Ph.D.
Planning Committee Co-Chair



Sharyn Rossi, Ph.D., 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, M.D., Ph.D.



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, Ph.D.



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, Ph.D.



Diane Bovenkamp, Ph.D., 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, M.D., MSc



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, Ph.D.



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 B. Hengen, Ph.D.



Keith B. Hengen, Ph.D., is an 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, Ph.D.



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 compliment 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 in 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 Koroshetz, M.D.



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 excitoxicity 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, Pharm.D.



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.

Preventing Discrimination, Harassment, and Bullying Expectations for Participants in NASEM Activities

The National Academies of Sciences, Engineering, and Medicine (NASEM) are committed to the principles of integrity, civility, and respect in all of our activities. We look to you to be a partner in this commitment by helping us to maintain a professional and cordial environment. All forms of discrimination, harassment, and bullying are prohibited in any NASEM activity. This commitment applies to all participants in all settings and locations in which NASEM work and activities are conducted, including committee meetings, workshops, conferences, and other work and social functions where employees, volunteers, sponsors, vendors, or guests are present.

Discrimination is prejudicial treatment of individuals or groups of people based on their race, ethnicity, color, national origin, sex, sexual orientation, gender identity, age, religion, disability, veteran status, or any other characteristic protected by applicable laws.

Sexual harassment is unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature that creates an intimidating, hostile, or offensive environment.

Other types of harassment include any verbal or physical conduct directed at individuals or groups of people because of their race, ethnicity, color, national origin, sex, sexual orientation, gender identity, age, religion, disability, veteran status, or any other characteristic protected by applicable laws, that creates an intimidating, hostile, or offensive environment.

Bullying is unwelcome, aggressive behavior involving the use of influence, threat, intimidation, or coercion to dominate others in the professional environment.

Section 1.01 REPORTING AND RESOLUTION

Any violation of this policy should be reported. If you experience or witness discrimination, harassment, or bullying, you are encouraged to make your unease or disapproval known to the individual, if you are comfortable doing so. You are also urged to report any incident by:

- Filing a complaint through the National Academies Complaint Intake Form, and/or
- Filing a complaint with the (OHR) (Keck WS302 Hours: 9am 4pm ET, Monday-Friday; hrservicecenter@nas.edu; Phone: 202-334-3400; Fax: 202-334-3850)at 202-334-3400, or
- Reporting the incident to an employee involved in the activity in which the member or volunteer is participating, who will then file a complaint with the Office of Human Resources.

Complaints should be filed as soon as possible after an incident. To ensure the prompt and thorough investigation of the complaint, the complainant should provide as much information as is possible, such as names, dates, locations, and steps taken. The Office of Human Resources will investigate the alleged violation in consultation with the Office of the General Counsel.

If an investigation results in a finding that an individual has committed a violation, NASEM will take the actions necessary to protect those involved in its activities from any future discrimination, harassment, or bullying, including in appropriate circumstances the removal of an individual from current NASEM activities and a ban on participation in future activities.

Section 1.02 CONFIDENTIALITY

Information contained in a complaint is kept confidential, and information is revealed only on a need-to-know basis. NASEM will not retaliate or tolerate retaliation against anyone who makes a good faith report of discrimination, harassment, or bullying.

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