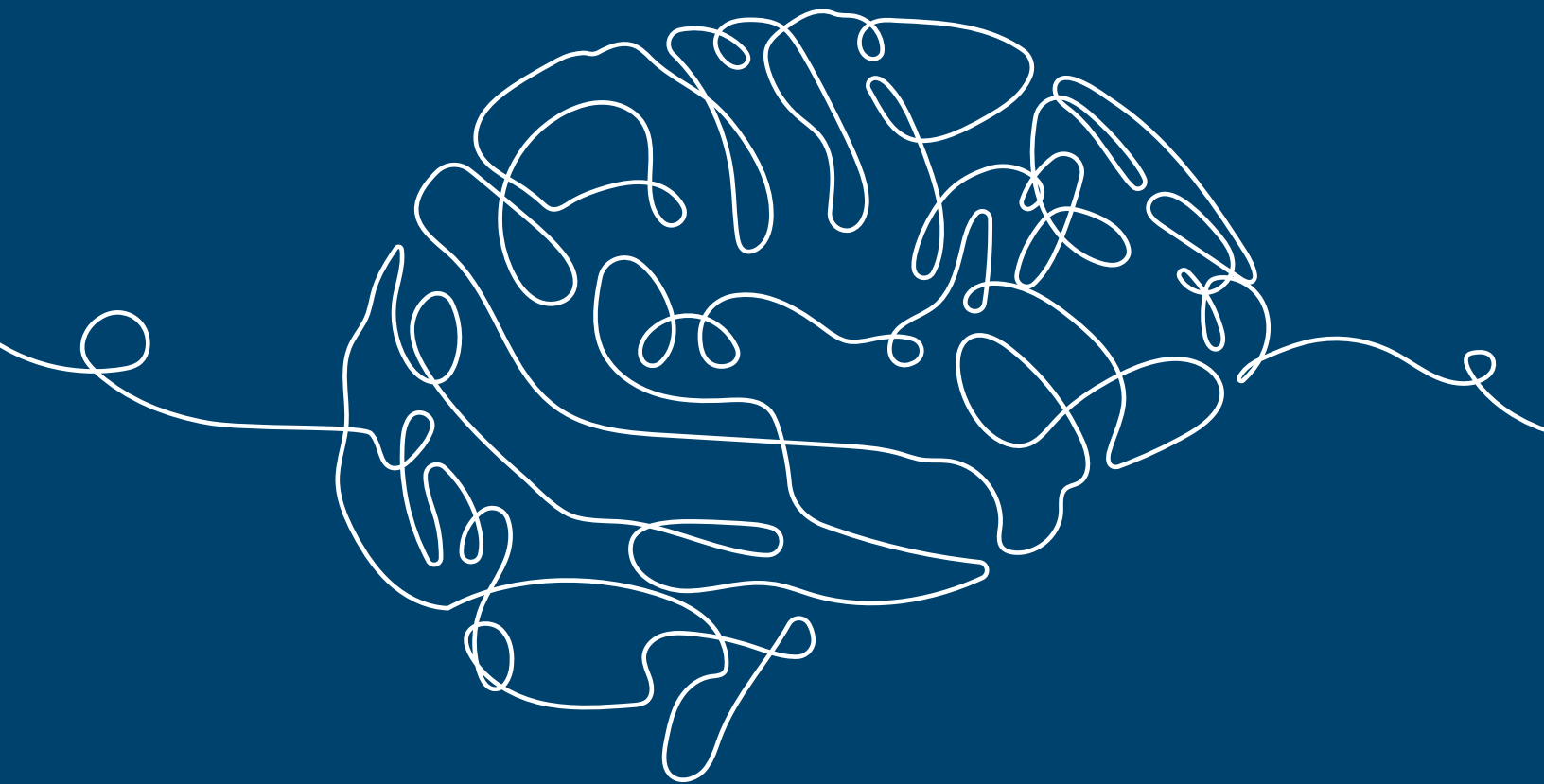
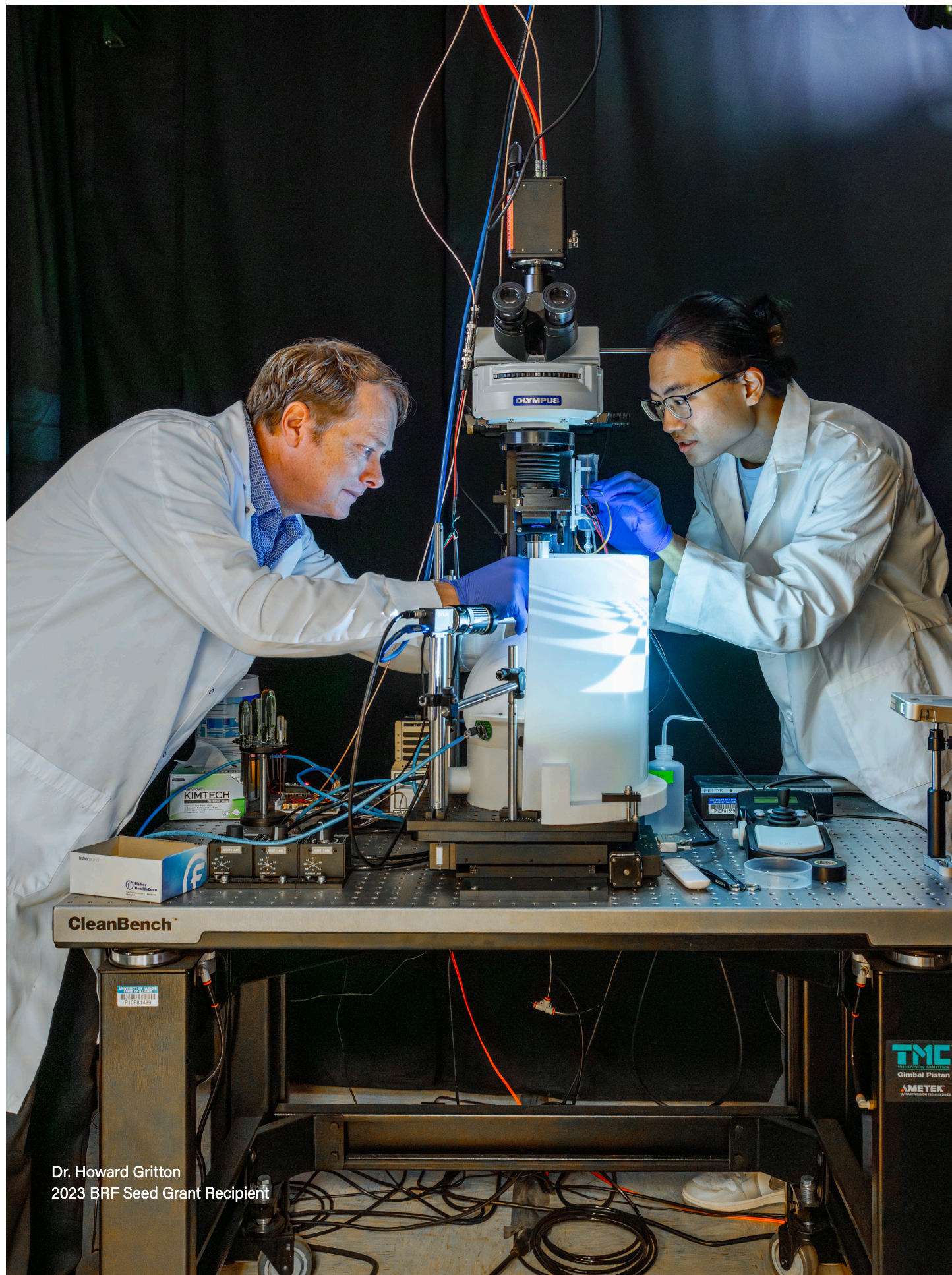


future.

forward.





Dr. Howard Gritton
2023 BRF Seed Grant Recipient

future. forward.

- igniting bold ideas
- accelerating progress
- building successful careers
- creating the tools of the future
- advancing our understanding of the brain

Brain Research Foundation is propelling the field of neuroscience into the future.

Instead of focusing on well-established researchers using legacy techniques and building on the old, BRF supports the changemakers of the future. BRF identifies the most promising researchers and boldest risk-takers, catapulting their careers to the next level.

BRF grant recipients take the field of neuroscience forward by leaps and bounds. They take risks on big ideas. They build tools that accelerate the discovery timeline from years to months. They leverage technology to rapidly translate discoveries into tangible improvements in patients' lives.

BRF's proven approach has yielded tremendous advances in brain science over its 70 years of operation. In this report, you will learn about some of the transformative BRF-funded discoveries that promise to accelerate research progress and deliver cures.

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funding brain research
 is the only way
 forward

Brain Research Foundation funds research that impacts our understanding of all diseases and disorders of the brain.

dear friends,



The theme of Brain Research Foundation's 2024-2025 Impact Report "future. forward." is more than a concept; it is the imperative that drives our mission. For over seven decades, BRF has been focused on a singular goal – advancing the understanding of the brain.

The impact of BRF on the vast landscape of neuroscience may seem small but it is significant. Currently, we are supporting 37 research projects at 31 institutions throughout the United States. In this report, we chose to feature four fascinating projects. Two focus on grantees that have completed their projects in 2024 or 2025. The other two articles highlight the research of new grantees who have already been able to make great strides on their projects. All the scientists are studying basic concepts with an innovative approach:

- Sleep is crucial for maintaining a healthy brain. And more importantly, quality sleep is key. 2025 Seed Grantee, Dr. Iris Titos Vivancos is studying how muscles release molecules during exercise that can promote deeper sleep.
- Touch impacts mental and physical health. Dr. Ishmail J. Abdus-Saboor is uncovering how sensors in the skin transmit information about pleasurable touch to the brain with a potential for therapies for anxiety, stress, and depression.
- Hearing issues are common in those who are aging, and individuals with brain conditions like autism or attention deficit-hyperactivity disorder. Dr. Howard Gritton is investigating how the brain can filter out background noise and why it's difficult for some people to do so.
- Calorie restriction, a dietary pattern that involves consuming fewer calories than one's body requires, has potential health benefits, including slowing the progression of age-related brain disorders. 2025 Seed Grantee, Dr. Junyue Cao hopes to develop therapies that mimic the beneficial effects of calorie restriction without the sacrifice.

Our vision for the future of neuroscience is to improve lives through new treatments and cures for all neurological disorders. The investigators above, and all our grantees, are attempting to accomplish this as well.

The path forward is defined by collaboration, innovation, and a collective commitment to understanding the most complex system known to humanity – the brain. And with BRF's help through the years, neuroscience is poised to translate decades of foundational research into revolutionary technologies and therapeutic strategies that will fundamentally alter what is possible for human health.

With your support, BRF will continue to strive for its realization.

Thank you for your generosity and for believing in the power of philanthropy.

Sincerely,

Terre A. Constantine, Ph.D.
Executive Director and CEO



As the Chairman of the Board of Brain Research Foundation, I want to take this opportunity to express my heartfelt gratitude to you and all our esteemed donors for your unwavering support of neuroscience research. Your generous contributions play an indispensable role in our mission to uncover treatments and cures for debilitating neurological conditions.

It is supporters like you who understand the critical importance of basic neuroscience research. The studies we conduct serve as a vital foundation of data, empowering scientists to build upon our findings and ultimately move closer to breakthroughs that can significantly impact the lives of those affected by various diseases of the brain and nervous system.

Your commitment to advancing the frontiers of neuroscience is not only commendable but essential. Together, we are making profound strides toward a future where devastating conditions can be effectively treated or even cured.

This extraordinary work would not be possible without the following:

- The Board of Trustees, who can always be counted on to stay true to our mission and who support their passion for BRF with loyalty and generosity.
- The Scientific Review Committee, who review all letters of intent and applications for both our grant programs, the Scientific Innovations Award, and Seed Grants. This small but mighty committee of eight go above and beyond to ensure that we continue to fund the nation's most innovative neuroscience.
- Dr. Terre A. Constantine, Executive Director and CEO, Sandra Jaggi, Director of Philanthropy, and Janie Jenkins, Bookkeeper. The expertise and dedication to our cause ensures that we operate daily with the highest level of integrity and we stay true to our commitment that 100% of all donations made to BRF go towards research.

I hope you enjoy reading this Impact Report and feel as proud to be a part of so much success as I do.

Thank you once again for your invaluable support. It is our collective dedication that will drive innovation and hope in this essential field of medical research.

Sincerely,

Scott P. Serota
Chairman, Board of Trustees



Dr. Iris Titos Vivancos
2025 BRF Seed Grant Recipient

shifting paradigms

- approaching problems from a new angle
- taking parallel tracks to accelerate breakthroughs
- speeding the pace of progress with cutting-edge tools and technologies

Neuroscientists have long focused on unlocking the secrets of the brain to develop therapies for brain conditions. Now, growing evidence of the brain-body connection's importance in brain health is leading neuroscience in an exciting new direction. And BRF is at the forefront of this research.

BRF grants are supporting paradigm-shifting scientists searching for answers to persistent dilemmas at the brain-body interface. BRF's grantees are tracing the bidirectional connections and signals between body and brain. They are learning how behaviors like exercise, touch, sleep and eating habits shape brain health. They are using their insights to develop new therapies that leverage these connections, including treatments that may target the body to boost brain health.

BRF grantees are using computer technology to crack the codes that transmit sensory information to the brain and fine-tune devices for people with sensory conditions. They are leveraging the power of human touch to tackle mood disorders. They are creating tools that will provide scientists with a real-time window into brain processes, enabling them to more quickly identify therapeutic targets.

These developments are a testament to BRF's vision of funding the most innovative scientists taking on high-risk, high-reward projects. BRF's grant process is giving these scientists a leg up as they launch careers yielding faster returns on the Foundation's investments.

BRF grant process

To identify the changemakers of the future, Brain Research Foundation invites universities nationwide to nominate their best and brightest scientists for BRF grants each year. These innovators lay out a vision for how their work will advance neuroscience or a disease affecting the brain with a detailed research proposal.

BRF's Scientific Review Committee (SRC), comprised of a diverse group of highly accomplished scientists, reviews the proposals. They select projects with the most potential to advance the field of neuroscience, both now and into the future.

The SRC looks for projects with transformative potential. They look for investigators developing the tools of tomorrow's researchers. The SRC seeks out problem solvers tackling persistent mysteries by approaching them from new angles. They support scientists revealing the basic biology of brain health and unlocking the potential for innovative therapies for a range of brain conditions.

The BRF grant process enables scientists to secure funding more quickly, in months, compared to a year or more for traditional funding sources. By speeding up the process, BRF enables scientists to test bold new ideas more quickly and accelerates the careers of tomorrow's changemakers.

The SRC's experience and vision have helped BRF to give a leg up to generations of scientists, supporting them as they build sustainable careers and accelerating the pace of progress. The grants have yielded new insights into the brain, new tools that are accelerating the pace of brain research, and new therapies that have the potential to improve the lives of people with brain conditions.

Brain Research Foundation Seed Grants provide early career scientists with the support they need to build their laboratories and launch new lines of inquiry. In 2024, Seed Grants provided \$80,000 over two years. In 2025, that amount increased to \$100,000 over two years. Young investigators use the grants to answer questions and generate the preliminary data necessary to pursue long-term funding from traditional grant funders like the National Institutes of Health.

Brain Research Foundation Scientific Innovations Award supports established neuroscience investigators pursuing innovative ideas or pivoting in new research directions. The award provides \$150,000 over two years that experienced investigators can use to pursue projects that are considered too speculative for traditional funders but have a high potential for yielding field transformative insights.

Brain Research Foundation Scientific Review Committee (SRC)

Craig Blackstone, M.D., Ph.D.
Harvard Medical School

Daniel A. Peterson, Ph.D.
Rosalind Franklin University

Scott T. Brady, Ph.D., SRC Chair
University of Illinois Chicago

Kerry J. Ressler, M.D., Ph.D.
Harvard Medical School

Tammy Kielian, Ph.D.
University of Nebraska

Nenad Sestan, M.D., Ph.D.
Yale University

Yamuna Krishnan, Ph.D.
The University of Chicago

Gordon M.G. Shepherd, M.D., Ph.D.
Northwestern University

2024 Seed Grant Winners

VINEET AUGUSTINE, PH.D.

University of California, San Diego

Project Title: A New Model Organism for Neurocardiac Research

Keywords: Heart Attack, Heart-Brain Research, Cardiac Sensory Neurons

DANIEL BAYLESS, PH.D.

The Salk Institute

Project Title: Understanding the Impact of ASD-linked Genes on Subcortical Processing of Social Cues

Keywords: Social Behavior, Autism Spectrum Disorders (ASD)

RYANN FAME, PH.D.

Stanford University

Project Title: How Cerebrospinal Fluid (CSF) Ions Control Early Brain Generation and Excitability

Keywords: Neural Development, Stem Cells, Autism Spectrum Disorders (ASD), Epilepsy, Schizophrenia

JESSE H. GOLDBERG, M.D., PH.D.

Cornell University

Project Title: Dopaminergic Mechanisms of Social Cooperation and Observational Learning

Keywords: Dopamine, Parental Care, Mechanisms of Social Cooperation and Learning

TOSHIRO HARA, PH.D.

University of Michigan

Project Title: Understanding Brain Tumor Invasion Using Single-Spatial Analyses

Keywords: Brain Tumor, Glioblastoma, Cancer Neuroscienc

MARK T. HARNETT, PH.D.

Massachusetts Institute of Technology

Project Title: New Approaches to Aging-Related Changes of Cortical Synapse Structure and Function in Humans and Mice

Keywords: Aging, Cognitive Decline, Neurodegenerative Disorders, Alzheimer's Disease, Dementias

DEMENTIA SOCIETY OF AMERICA SEED GRANT

PREEYA KHANNA, PH.D.

University of California, Berkeley

Project Title: Using Brain-machine Interfaces to Uncover and Test Neural Principles of Somatosensory-Motor Integration

Keywords: Essential Tremor, Parkinson's Disease, Stroke, Brain Injury, Motor Control

AARON T. KUAN, PH.D.

Yale School of Medicine

Project Title: Molecular Connectomics Using Pan-Staining Expansion Microscopy

Keywords: Synaptic Function, Neurodegenerative Diseases, Alzheimer's Disease, Parkinson's Disease and Huntington's Disease

HEIDI C. MEYER, PH.D.

Boston University

Project Title: Capturing and Constraining Neuronal Ensembles of Fear Memories to Curb Anxiety

Keywords: Anxiety Disorders, Fear, Stress, Psychiatric Disease

WOMEN'S COUNCIL SEED GRANT

ROBERT R. PARRISH, PH.D.

Brigham Young University

Project Title: The Role of Chloride Loading in Seizure Termination

Keywords: Epilepsy, Seizures, Brain Implant

YI-RONG PENG, PH.D.

University of California, Los Angeles

Project Title: Decoding the Formation and Degeneration of Neural Circuits via Cell-Type-Specific Surface Proteomics

Keywords: Retina, Neurodegenerative Diseases, Nervous System

JON RESCH, PH.D.

University of Iowa

Project Title: Hypothalamic Circuitry Underlying Thirst

Keywords: Thirst, Dehydration, Hunger, Motivated Behavior

REBECCA M. VOORHEES, PH.D.

California Institute of Technology

Project Title: Identification of Cell Type-Specific Factors for Biogenesis of Membrane Proteins in the Central Nervous System

Keywords: Olfactory Receptors, Genetics, Membrane Proteins, Neurons

HILLEL ADESNIK, PH.D.

University of California, Berkeley

Project Title: All Optically Probing the Neural Codes of Perception in the Primate Brain

Keywords: Neuroscience, Sensory Perception, Cortex, Primate, Optogenetics

EIMAN AZIM, PH.D.

The Salk Institute for Biological Studies

Project Title: Learning From Error: Defining How Cerebellar Circuits Drive Adaptation in a Changing World

Keywords: Motor learning, Dexterity, Prediction Errors, Sensorimotor Adaptation, Cerebellum, Inferior Olive, Red Nucleus

STEFFEN B.E. WOLFF, PH.D.

University of Maryland, Baltimore

Project Title: When Poems Jumble Tennis Serves: Dissecting How Learning Systems Interact

Keywords: Multi-task Learning, Memory, Memory Deficits, Motor Skills

TAKESHI YOSHIMATSU, PH.D.

Washington University in St. Louis

Project Title: Zebrafish Model to Study Visual Attention

Keywords: Visual Attention, Attention-deficit/Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD)

JAMES J. DICARLO, M.D., PH.D.

Massachusetts Institute of Technology

Project Title: Using Computer Models of the Neural Mechanisms of Visual Processing to Non-Invasively Modulate Brain States

Keywords: Neural Network Models, Affective Disorders, Non-invasive Interventions, Amygdala, Visual Ventral Stream

ROSALIE A. CIARDULLO SCIENTIFIC INNOVATIONS AWARD

2024 Scientific Innovations Award Grantees

2025 Seed Grant Winners

JOSÉ MANUEL BAIZABAL CARBALLO, PH.D.

Indiana University Bloomington

Project Title: Heterochromatin Mechanisms of Cortical Expansion

Keywords: Neurodevelopmental Disorders, Cortex, Epigenetics, Autism, Schizophrenia

JESSICA L. BOLTON, PH.D.

Georgia State University

Project Title: Chemogenetic Tools in Microglia as a Novel Therapeutic Approach for Brain Disorders

Keywords: Early-life Adversity, Depression, Neurodevelopment, Synaptic pruning

JUNYUE CAO, PH.D.

The Rockefeller University

Project Title: Elucidate the Molecular and Cellular Targets of Caloric Restriction in Rejuvenating Aged Mammalian Brain

Keywords: Caloric restriction, Brain Aging, Alzheimer's Disease

DEMENTIA SOCIETY OF AMERICA SEED GRANT

VASILEIOS CHRISTOPOULOS, PH.D.

University of Southern California

Project Title: Understanding the Mechanisms of Micturition in the Brain and Spinal Cord

Keywords: Bladder Control, Micturition, Incontinence, Spinal Cord Injury, Parkinson's Disease, Multiple Sclerosis

JARED M. CREGG, PH.D.

University of Wisconsin

Project Title: Brainstem Blueprints: Microcircuit Basis of Left/Right Motor Decisions

Keywords: Decision-making, Locomotion, Orientation, Motor Circuits

ELIZABETH CROUCH, MD., PH.D.

University of California, San Francisco

Project Title: Capillaries to Circuits: Neurovascular Coupling in the Developing Brain

Keywords: Brain Vasculature, Germinal Matrix Hemorrhage, Premature Babies

KELSIE EICHEL, PH.D.

University of Colorado, Boulder

Project Title: Investigating Extracellular Matrix Regulators of Neuronal Function in the Mammalian Brain

Keywords: Axon Initial Segment, Neuronal Signal Generation, Autism Spectrum Disorder, Bipolar Disorder, Schizophrenia, Alzheimer's Disease

LINLIN FAN, PH.D.

Massachusetts Institute of Technology (MIT)

Project Title: Probing Plasticity Mechanisms of Engram Formation with All-Optical Physiology

Keywords: Plasticity, Engram, Memory

VIKRAM GADAGKAR, PH.D.

Columbia University

Project Title: In Search of Memory: The Neural Substrate for the Song Template

Keywords: Auditory Templates, Songbirds, Vocal Learning, Autism

JUNJIE GUO, PH.D.

Yale University

Project Title: Alternative mRNA Translation and Cell Type-Specific Proteoforms in the Brain

Keywords: Cell Type, mRNA Translation, Proteoform, Ribosome, Brain Function, Aging

SCOTT R. PLUTA, PH.D.

Purdue University

Project Title: Cortical and Subcortical Interactions Mediating Value-Based Sensory Processing

Keywords: Addiction, Decision-making, Sensory Processing, Learning, Plasticity

ROSALIE A. CIARDULLO SEED GRANT

GABRIELLE POUHELON, PH.D.

Cold Spring Harbor Laboratory

Project Title: The Development of Attention-Associated Cholinergic Inputs to the Cortex

Keywords: Development, Attention Deficit/Hyperactivity Disorder, Sleep, Sensory Inputs

GILBERT J. RAHME, PH.D.

Stony Brook University

Project Title: Uncovering Transcription Factor Drivers of a Pathogenic Oligodendrocyte Progenitor Cell

Keywords: Brain Tumor, Glioma, Epigenetics, Developmental Disorders

IRIS TITOS VIVANCOS, PH.D.

Northwestern University

Project Title: Deciphering Muscle Regulation of Sleep

Keywords: Sleep, Muscle, Exercise

WOMEN'S COUNCIL SEED GRANT

ANNA L. VLASITS, PH.D.

University of Illinois, Chicago

Project Title: The Role of Sensory Multiplexing in Guiding Natural Visual Behaviors

Keywords: Vision, Retina, Color, Motion

2025 Scientific Innovations Award Grantees

ROBERT FROEMKE, PH.D.

New York University

Project Title: The Neuroscience of Families: Social Behavior in Naturalistic Controlled Environments

Keywords: Social Behavior, Oxytocin, Parenting, Territory

KENNETH PREHODA, PH.D.

University of Oregon

Project Title: Brain Regeneration Dynamics Using the Transparent Fish *Danio rerio* Cerebrum

Keywords: Neural Stem Cells, Regeneration, Brain Injury

DORIS TSAO, PH.D.

University of California, Berkeley

Project Title: Understanding How Psychedelics Affect Top-down Belief Propagation in the Primate Brain

Keywords: Psychedelics, Perception, Consciousness, Depression, PTSD, Mental Health Disorders

ROSALIE A. CIARDULLO SCIENTIFIC INNOVATIONS AWARD

Breaking Down the Path to Better Sleep

A 2025 BRF Seed Grant is Accelerating Research on the Link Between Exercise and Sleep Quality

In less than a year, **Dr. Iris Titos Vivancos**, an assistant professor in the Biochemistry and Molecular Genetics Department at Northwestern University, launched a new laboratory and has already begun collecting data toward the ambitious goal of understanding how signals from the body influence the brain and sleep quality.

Pivoting for Progress

As a postdoctoral researcher, Dr. Titos Vivancos discovered a pathway that allows the gut to send signals to the brain that regulate how deeply flies sleep. Her discoveries flipped a well-established brain-centric paradigm, highlighting the role of signals that do not originate in the brain in the regulation of behavior.

“Most of the time when we think about behavior regulation, we think uniquely about the brain” she said. “We showed that other organs like the gut can send signals to the brain that alter sleep behavior.”

This unexpected result led Dr. Titos Vivancos in a new direction towards understanding how the body and all its systems, including muscles, influence behavioral regulation.

“My lab is branching out from what I’ve done before, and we didn’t have a lot of preliminary data,” she said. “The BRF Seed Grant is going to allow us to produce the data we need to support this new direction and apply for federal funding and larger grants.”

The BRF’s Scientific Research Committee recognized the potential of Dr. Titos Vivancos’ paradigm-shifting work to have a major impact on the field. This support is crucial for new independent investigators: it shows that leading neuroscientists believe in the potential of her project, being a catalyst for future funding.

Importance of BRF Funding

The \$100,000, 2-year BRF Seed Grant enabled Dr. Titos Vivancos to move from just an idea to launching a new project studying how signals sent from the muscles to the brain after exercise contribute to deeper sleep.

“We all know that we feel different after exercise: our muscles, our mood, and our sleep all feel different,” Dr. Titos Vivancos said. “During exercise, the muscles release molecules into the blood that can travel to different organs, including the brain. We want to understand how those molecular signals affect the brain and sleep.”

The BRF Grant provided vital seed money to get this new line of research off the ground quickly, something that wouldn’t have been possible with more traditional funding sources. Dr. Titos Vivancos explained that most grant funders want researchers to have either a long track record of research success on the topic or substantial data to support a new idea—two things that a researcher just launching their lab would not have. But BRF focuses on finding the most promising scientists who are pursuing the boldest ideas and giving them the support they need to launch their careers and begin delivering breakthroughs quickly. Dr. Titos Vivancos explained that the process between applying and obtaining a federal grant can take over a year, which can slow the rate of discoveries.



“That’s a major advantage with a BRF Seed Grant—you can branch out from your research program and get your experiments started faster,” Dr. Titos Vivancos said.

Return on Investment

The potential return on BRF’s investment in Dr. Titos Vivancos’ work could be huge for the field of neuroscience by helping unravel how physical activity influences sleep quality and brain health.

“For a long time, scientists studying sleep focused on how long people sleep but not the quality of their sleep,” she said. “The quality of sleep is as important as its amount for brain health.”

To look for answers, Dr. Vivancos turned to a tiny but powerful model—fruit flies. Despite being simpler organisms, fruit flies share many characteristics with humans. They engage in many of the same behavioral patterns as humans—like having a day-night wake sleep cycle. The underlying physiology of their brains and muscles are similar to humans and about three-quarters of the genes in fruit flies have human gene equivalents. Scientists often start looking for gene targets in fruit flies, then verify those targets in mammals like rodents before moving to humans.

Scientists have also developed sophisticated tools that make it easy to study fruit flies. Dr. Titos Vivancos used an automated tool that records the activity of individual fruit flies second-by-second for days at a time. Then, she developed a tool that delivers a vibration to the sleeping flies. The vibration was enough to wake up flies who were not deeply sleeping, while those who were sleeping deeply slept through it. Then, she systematically turned off 3,400 genes to see which ones would affect how deeply the flies slept. She noted that manipulating that many genes would have been impossible in more complex organisms.

“With this automated system, we can monitor when the fly wakes up and how often the fly wakes up,” she explained. “When I started turning off certain genes in the flies’ muscles, I could see they woke up a lot more often than they normally would. It looks like when those genes are turned on in the muscles, they send signals to the brain that promote deep sleep.”



Body Building for Brain Health

Dr. Titos Vivancos’ discoveries could help explain why exercise is so essential for brain health.

“We know that people who exercise feel better and that exercise may improve depression and anxiety,” she said. “We do not yet know which genes mediate that positive effect.”

By supporting an early-career researcher, BRF is boosting the prospect that its investment will yield scientific returns for decades to come. Dr. Titos Vivancos’ laboratory will build on her BRF-funded study to answer key questions about the role of sleep in brain health. Identifying the genes and molecules that help trigger deeper sleep after exercise may enable Dr. Titos Vivancos and her team to develop new therapies for sleep disorders. It might also lead them to new approaches to managing both muscle loss and sleep disturbances associated with aging.

“We know that exercise is essential to maintain skeletal muscle with aging; it may also be important to preserve sleep quality,” she said. “Understanding the pathways by which the muscle communicates with the brain could allow the development of future therapies mimicking the effect of exercise. That is especially relevant during ageing and for individuals that are not able to perform physical activity.” ■

Touch and Mental Health

A BRF Seed Grantee Reveals Brain-Body Connections are Key to the Healing Effects of Touch

A 2022 BRF Seed Grant—Dr. Ishmail Abdus-Saboor's first grant focusing on the brain health benefits of touch—helped launch him on his stratospheric trajectory. Just three years later he's fielding calls from reporters from around the world about his studies revealing the underpinnings of the brain health benefits of social touch. His success is a testament to BRF's tried-and-true approach to investing in the boldest scientists, doing transformative work.

When Dr. Abdus-Saboor received his BRF Seed Grant, he already had a strong track record for research on the nerves and body-to-brain circuits that control pain.



The Seed Grant funded a new project to map the nerve pathways that transmit information from a gentle human touch to reward centers in the brain, triggering pleasurable feelings.

"We crave these forms of touch," Dr. Abdus-Saboor explained. They are also key to social bonds and overall mental health. Historically, neuroscientists would mainly focus on the brain, but our big idea was that there are connections, synaptic connections between the nervous system in the body that connect the body, spinal cord, and the brain."

Other funders interested in expanding his established pain research were not willing to support this new line of inquiry into touch. However, BRF was prescient in recognizing the potential of this novel line of research to yield breakthroughs.

"BRF was okay with taking a chance on something new, and new for me," he said. "They saw the potential in this work."

Investment Pays Off

Dr. Abdus-Saboor and his colleagues are now patenting their discoveries and hope to spin-off a new company to develop new drugs for mood disorders based on what they've learned.

A SIGNIFICANT ROI

He's also been able to secure additional grants to continue the work and grow his lab, including a \$225,000 McKnight Scholar Award in 2023, a \$300,000 One Mind Rising Star Award in 2024, and the prestigious National Institutes of Health Director's Pioneer Award in 2025, that will provide his laboratory with \$3.5 million over five years. This represents a return on our \$80,000 investment of 5000%.



"Our BRF Seed Grant got us started on a project that morphed into something really important," Dr. Abdus-Saboor said. "My lab has ballooned because a lot of people want to work with me due to of these discoveries."

He also recently became a tenured faculty member at Columbia University in New York. His rapid rise is a testament to BRF's focus on not just funding a project but helping to accelerate the careers of brilliant young scientists whose work is likely to yield breakthroughs for decades to come and whose out-of-the-box ideas that will help propel their fields forward. It's a time-tested approach that keeps moving brain science forward.

Social Animals

Dr. Abdus-Saboor's previous research on pain had focused on the many nerves in the skin that detect pain or other uncomfortable sensations. His BRF Seed Grant helped him identify a small subset of nerve cells in the skin that respond to gentle touch. Then, he traced

how these skin sensors transmit information about pleasurable touch to the brain.

"The neurons appear to be wired to detect socially relevant cues, and the pattern of wiring that transmits signals from these nerves to the brain also seems to be important for processing this touch information," Dr. Abdus-Saboor said.

His studies in mice have shown that these signals trigger the release of dopamine, a chemical associated with pleasure, and oxytocin, a chemical released during social bonding activities, such as when a mother nurses her infant. The work culminated in a high-impact paper in the prestigious journal *Cell* that was covered by more than 30 news outlets around the world.

"The BRF Seed Grant catalyzed a whole new area of research for my laboratory," Dr. Abdus-Saboor said.

(continued on page 18)



BRF Funding Helps Cut Through the Noise

Advancing Breakthroughs on Hearing and Brain Science

We know there are five basic human senses. Most of us are familiar with the loss of vision, but hearing loss silently impacts 1.5 billion worldwide with devastating consequences. Without proper hearing, individuals risk social isolation, emotional issues like depression and anxiety, cognitive decline, and increased safety concerns due to missed warning sounds. New understanding about hearing could lead to new therapies for the one in five people worldwide living with hearing loss and millions more with sensory processing difficulties.

2023 BRF Seed Grantee **Dr. Howard Gritton**, an assistant professor of neuroscience in the Department of Comparative Biosciences at the University of Illinois, Urbana-Champaign, is leading research designed to better understand how the brain can filter out background noise and why it's difficult for some people to do so. This is often referred to as the "cocktail party problem."

Gritton and his team wanted to tackle a big and relatable problem. Why do so many people struggle to carry on a conversation in a crowded room with lots of background noise? This challenge can be particularly acute for individuals with hearing loss, those who are aging, and individuals with brain conditions like autism or attention deficit-hyperactivity disorder.

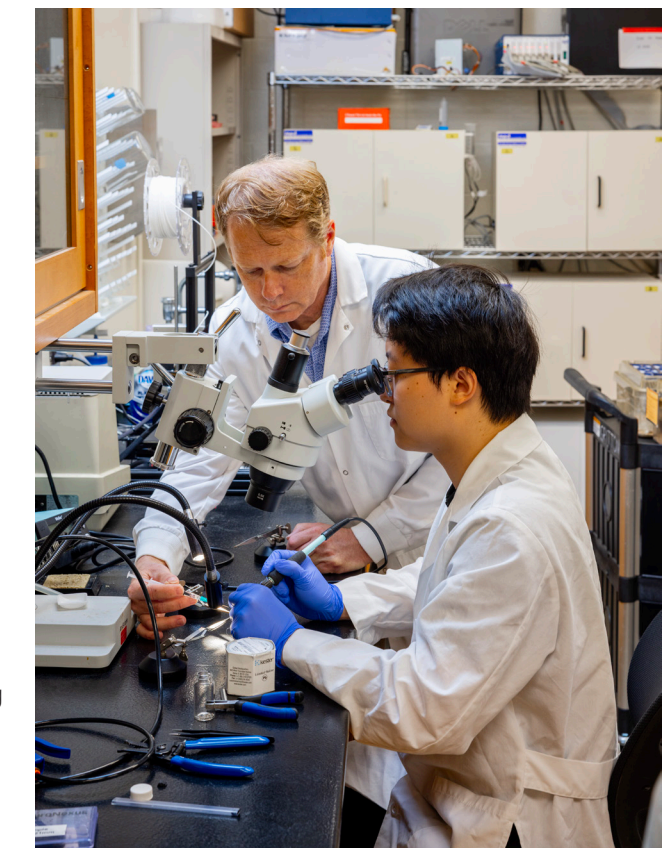
Betting on a Big Idea

The BRF Seed Grant came at a pivotal time for Dr. Gritton's laboratory. It provided him the funding to hire his first graduate student and pay for the equipment needed to study how the brain filters out background noise. Most federal grants require researchers to have either an established track record or preliminary data to support their ideas before funding them. But that can be challenging for new investigators starting out, especially those pursuing ground-breaking, high-risk, high-reward projects like Dr. Gritton's.

"What BRF does with its seed grants that is important is they take chances on new investigators with good ideas, but maybe have not collected a lot of data yet," Dr. Gritton said. "It allowed us to hit the ground running and start collecting data."

The experiments BRF helped fund examined brain activity in animals trained to respond to sounds coming from a particular area while ignoring background noise. The experiments revealed that small subsets of the 86 billion brain cells play unique and crucial roles in focusing hearing and filtering out background noise.

"Some types of brain cells are instrumental for filtering out the background noise so we can focus on the person or music we are trying to listen to," Dr. Gritton said.



(continued on page 20)

Since then, Dr. Abdus-Sabor and his colleagues have shown that this social touch-to-brain circuitry is present in every other mammal studied so far, suggesting it is a vital trait for survival across species.

"It is essential for social bonds during development and for the social life of the animal," he said.

Brain-Body Connection

These discoveries also have important implications for human brain health. Dr. Abdus-Sabor and his team are currently working to translate what they've learned from their initial BRF study into potential therapies for anxiety, stress, and depression that leverage this brain-body connection.

"The prevailing idea is that these are diseases of the brain, so they must be treated in the brain by drugs or other therapies targeting the brain," he said. "We are coming at this a whole different way. What if we can target skin as a therapeutic strategy?"

Preliminary data from ongoing studies suggest that stimulating this pathway in mice through touch may reduce anxiety, stress-related hormones in the blood, and improve social behaviors in mice with anxiety or depression-like conditions.

"We observe behavioral and physiologic changes that show tuning this pathway can be therapeutic," he said.

Dr. Abdus-Sabor hopes his work is pushing his colleagues in the field of brain science to think beyond the brain and consider the bi-directional signals sent between the brain and body. It's the kind of paradigm-shifting approach BRF aims to catalyze with its Seed Grants.

"Often, neuroscientists think about the brain as a master regulator, but the input it gets from the body is as important as the signals it sends out," he said. "My work is casting new light on brain-body connectivity." ■

Hearing Help

Just two years after receiving his BRF grant, Dr. Gritton and his collaborators are already working to translate their discoveries into new tools that could be life-changing for people with hearing and sensory difficulties.

The critical data collected with BRF's support allowed Dr. Gritton and colleagues to quickly secure a roughly \$3 million National Science Foundation Neural and Cognitive Systems Frontier grant to fund parallel experiments on noise filtering in humans and animals. While Dr. Gritton is focusing on animal studies, he's collaborating with colleagues at Boston University who will conduct identical experiments in humans, and other team members that will develop computer models of these processes.

Dr. Gritton's success is a testament to the impact of BRF's Seed Grant program. By finding the most promising investigators with new or groundbreaking ideas and giving them freedom and flexibility to use their grant how they see best, BRF is helping to drive innovation towards new therapies for brain disease.

The goal is to translate discoveries more quickly from animal studies to advances that can help humans. They are hoping to use what they learn from the parallel human-animal studies to develop sophisticated

computer algorithms that can improve hearing assistance devices to selectively filter sound.

These advances could be life-changing not only for people with hearing impairments but also for those experiencing age-related hearing changes. For example, Dr. Gritton noted that even people with perfect hearing may develop difficulties filtering out background noise as they age.

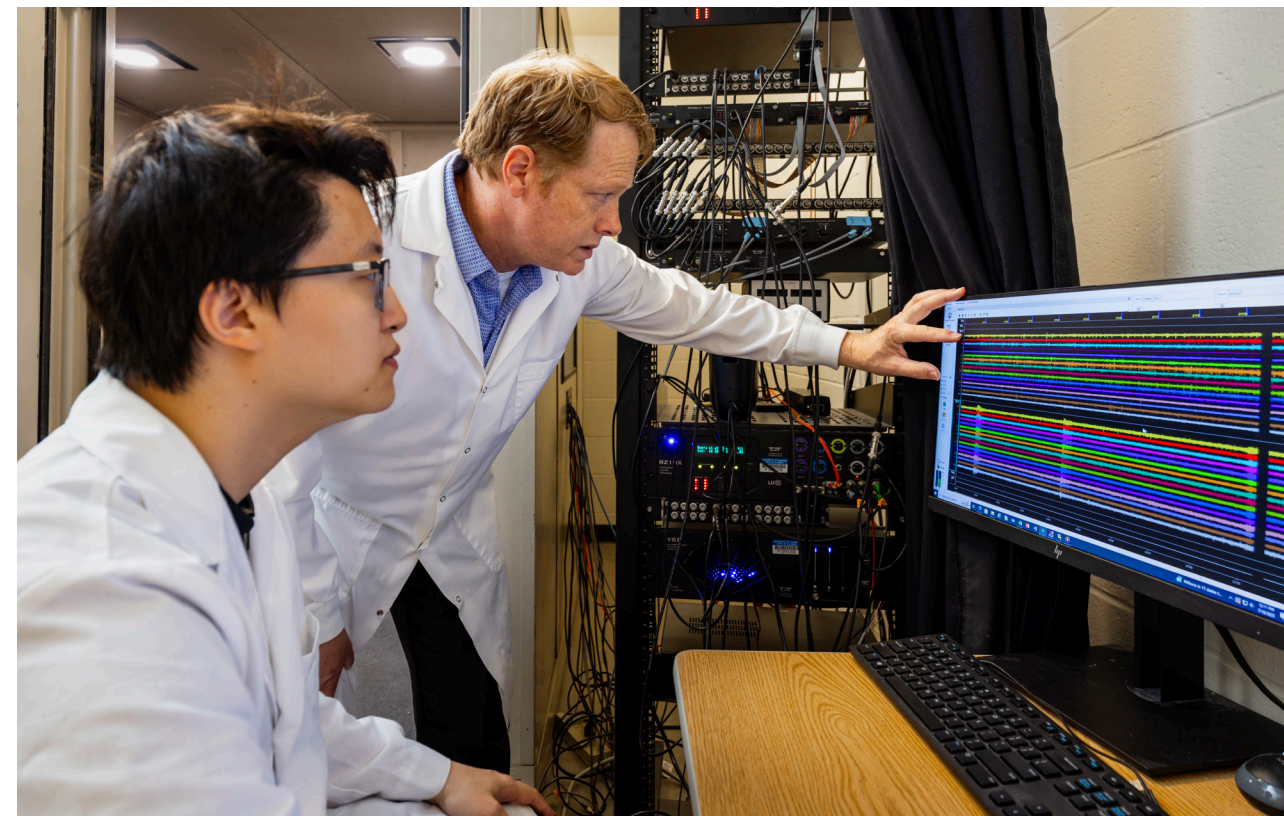
Building Toward Breakthroughs

Dr. Gritton's BRF Seed Grant funding and the data it yielded laid the groundwork for research that could have an even broader impact on transforming hearing science and an even deeper understanding of how the brain filters out noise.

The data collected with the help of the BRF grant, helped Dr. Gritton and his colleagues at the University of Illinois to secure a second \$1.8 million National Science Foundation grant to fund the development of brain organoids—mini three-dimensional models of small sections of living brain tissue—that they can use to study hearing-relevant brain processes like filtering or selective amplification. These 3-D models may help further accelerate the team's discoveries and more quickly test experimental therapies while reducing the need for animal studies.

"These 3D models will help us understand how rhythms inherent in brain processing could contribute to the process of filtering out background noise," he explained. "This will allow us to control and manipulate brain rhythms in a way that would be difficult or impossible in a living animal."

So far, they have found that some rhythms enhance attended sounds, and other brain rhythms suppress background noise. Next, they want to understand how these rhythms may be affected by certain brain conditions.



Translational Approach

The next step for the team will be studying differences in noise filtering and brain rhythms in an animal model of autism. Dr. Gritton explained that autism is in part a sensory processing disorder. He and his colleagues have already shown in pilot studies that mice with an autism-linked gene deletion can easily complete tasks that require sound decoding in quiet environments. But they struggle in environments where there are competing sounds, just like some individuals with autism.

"Our experiments may help explain hearing hypersensitivity in people with autism," he said. "It may be that some individuals are not able to effectively filter out less important sounds."

What they learn may lead to additional studies on challenges with sound filtering in people with other disorders including attention deficit hyperactivity disorder, age-related hearing difficulties, and cognitive decline or dementia. It could also lead to the development of new therapies to help individuals with these conditions cope in noisy environments, as well as a better understanding of the role brain rhythms play in basic brain functions.

AN IMPRESSIVE RETURN ON INVESTMENT

Dr. Gritton leveraged the data he generated from his initial \$80,000 Seed Grant to secure an additional \$4.8 million in funding to advance his breakthrough research on hearing impairment. That 6000% return on BRF's initial investment shows the power of BRF's high-risk, high reward funding strategy.

"Most people take hearing for granted. They certainly don't question how it works. But we are learning that attentional processing is very important, and it has implications for a lot of different disorders," Gritton said. "We are working to understand what rhythms in the brain do and how they help us process sensory information, learn what is important, and commit it to memory. And I am grateful that BRF takes chances to fund investigators with new ideas that have the potential to shake up the status quo and lead to revolutionary advances in the treatment of brain diseases—because that is what my lab aims to do." ■



Cutting Calories to Boost Brain Health

Genetic Tools Help Reveal How Calorie Restriction Combats Age-Related Brain Diseases

A 2025 BRF Seed Grant recipient, **Dr. Junyue Cao** hopes to develop new therapies that mimic the brain-protective effects of calorie-restrictive diets.

There is a lot of buzz about the brain benefits of calorie restriction, which studies show can extend life spans and slow the progression of age-related brain disorders like Alzheimer's disease. However, not everyone is willing to commit to the planning required to slash roughly one-third of their daily calorie intake while maintaining adequate nutrition. Dr. Cao, the Fischer Center Foundation Assistant Professor at Rockefeller University in New York, hopes to develop therapies that imitate the brain benefits of calorie restriction without the sacrifice.

Along the way, Dr. Cao and his team are generating and refining cutting-edge tools that could allow other brain scientists to quickly and inexpensively map gene expression in the brain.

"We are grateful for BRF's generous support," Cao said. "It is not only helping answer key questions about the role of calorie restriction in brain health, but it is also helping us develop brain mapping tools that could accelerate the pace of discovery throughout the field of brain science."

Mapping Brain Health

Dr. Cao's laboratory focuses on developing tools that laboratories can use to scan the entire brain to identify cells or areas that are altered by aging or brain diseases. The goal is to identify novel targets for treating age-related mental decline and other brain diseases.

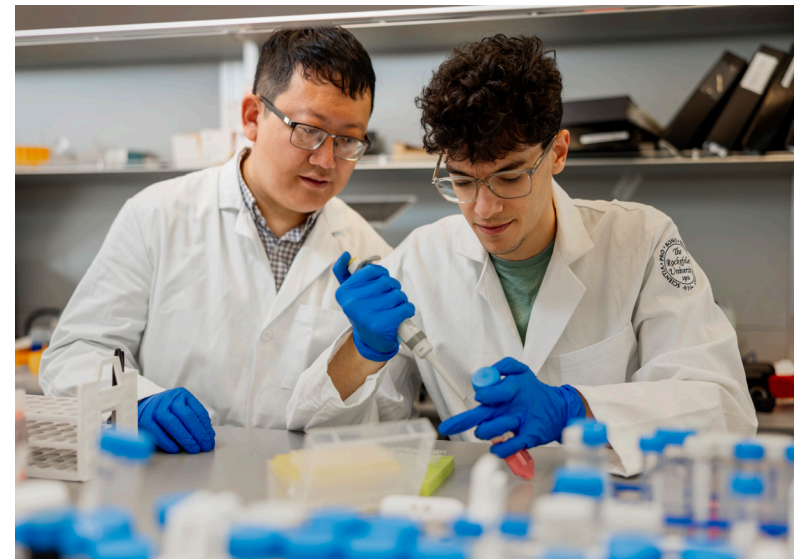


Traditional methods and tools for identifying brain cell targets are slow, labor-intensive, and costly. However, a pair of new tools developed by Dr. Cao and his team can simultaneously track gene expression in millions of individual cells in the brain and map the brain regions where these changes are occurring.

The technique uses millions of barcoded DNA sequences to help scientists quickly map gene expression throughout the brain. They are also developing computer algorithms that analyze the data and allow scientists to examine gene expression in specific brain regions or cells.

With support from his BRF Seed Grant, Dr. Cao and his team are narrowing down the specific cells and brain regions responding to calorie restriction. This information is vital to the molecular detective work needed to identify the gene culprits and how they protect brain function. Once they've identified the players, they can develop gene therapies that mimic the beneficial effects of calorie restriction.

By supporting this vital project, the BRF Seed Grant is also helping to support the training of graduate students in the use of these new techniques, growing the talent pool of people who can spread the use of these new technologies to more laboratories as they launch independent careers.



"If we can develop ways to mimic or amplify the effects of calorie restriction, it could help improve brain function as people age and improve brain function in people with neurodegenerative diseases," he said.

Accelerating Progress

Dr. Cao's techniques sped up the process so much that the results have already been published in the prestigious journal, *Cell Reports*, just months after Dr. Cao received the Seed Grant.

This remarkable turnaround demonstrates the rapid return on investment of BRF's time-tested funding approach. By funding talented scientists building next-generation tools, BRF is not only speeding up the pace of individual research studies but helping to accelerate progress across the field of brain science.

Dr. Cao and his team aim to refine and commercialize their whole-brain genome scanning techniques, making them available to other laboratories to conduct studies of gene expression in the brain more rapidly and cost-effectively.

"By looking at the expression of thousands of genes in millions of cells simultaneously, it increases the chances we will find the most important ones," Dr. Cao said. "It also makes it possible to observe dynamic processes, like circadian rhythms, which would be difficult with traditional approaches." ■

"The funding is helping us to train the next generation of scientists in aging biology and brain science so they can identify new potential therapies for brain disorders," Dr. Cao said.

Resetting the Clock

The BRF Seed Grant Dr. Cao received in July 2025 is already bearing fruit.

"We used the technology to scan the whole mouse brain under normal diet conditions and under calorie restriction to see which brain regions and cells are reacting to the diet," he said. "We found that specific brain regions respond to calorie restriction more strongly than others. That includes the ventral and white matter regions, which are most vulnerable to age-related decline."

Based on Dr. Cao's research, calorie restriction appeared to protect brain cells from death. It also helped reset brain cells that act like a "clock" which helps keep the brain tuned to the 24-hour day-night cycle. These clock cells help regulate bodily functions in response to the amount of daylight. They tell systems throughout the body when to wake up and when to go to sleep. By maintaining these daily circadian rhythms, clock cells play a vital role in overall health.

Dr. Cao and his team are now trying to find ways to recreate the beneficial effects of calorie restriction on the brain by targeting the mechanisms they have identified. Such therapies may be beneficial for older adults who may increasingly experience sleep difficulties that can contribute to cognitive decline.



with gratitude

Your dedication and support of BRF’s mission has enabled the discovery of neuroscience data that will enable countless breakthroughs for decades to come. Without those that have supported us for the past two years, our ability to help get closer to answers and cures of devastating diseases of the brain and nervous system would not have been possible. We are grateful for your passion and commitment.

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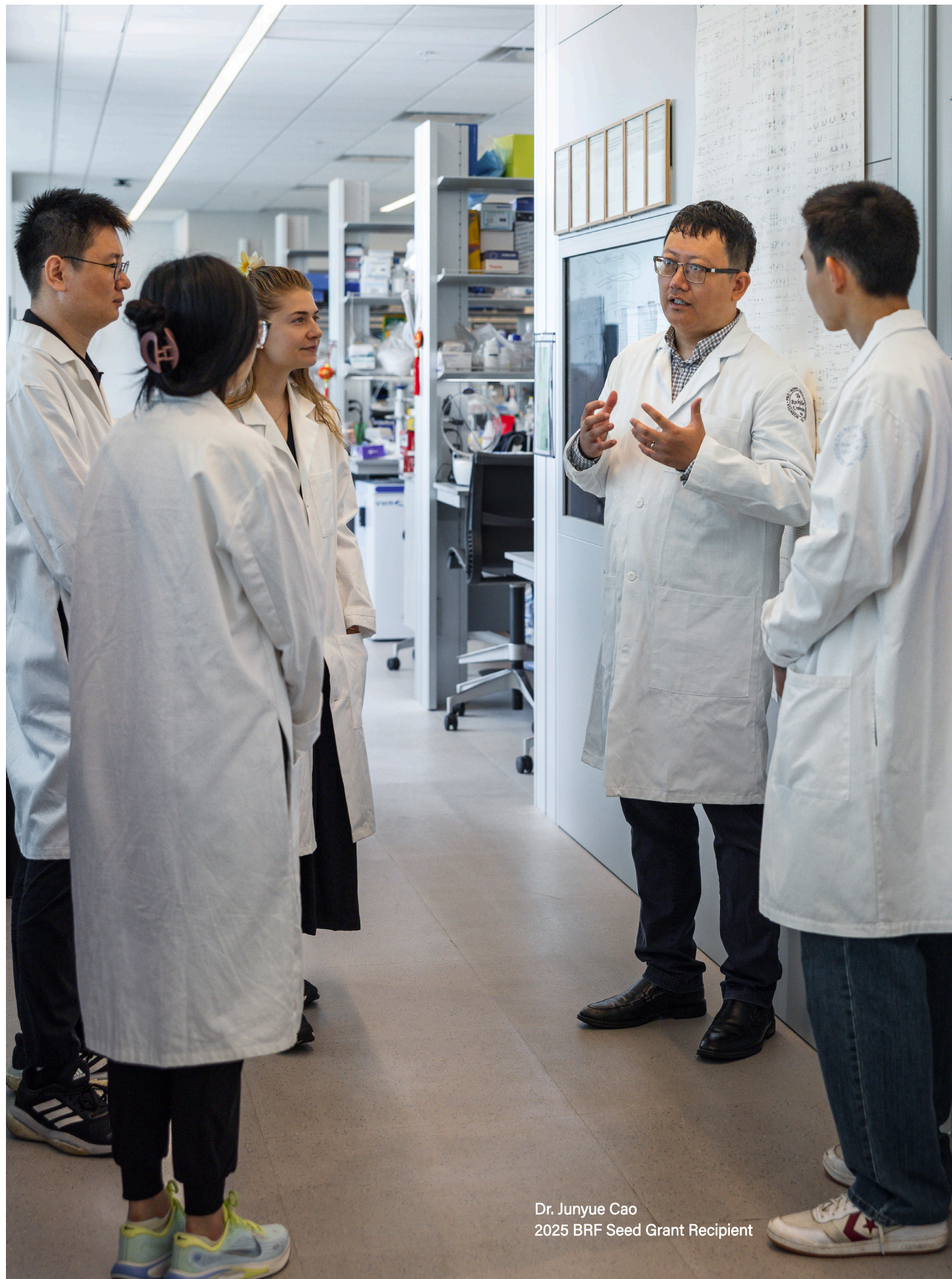
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Letter from the treasurer

Brain Research Foundation continues to fund groundbreaking research thanks to the increasingly generous contributions of our donors and our superior investment performance. During the last two years, more than 100% of our annual donor contributions have been used to fund research and educational programs in neuroscience. We are proud of having achieved these results, on average, over the last thirteen years.

BRF continues to fund the most innovative neuroscience research in the most beneficial ways to advance the understanding of the brain. Currently, we are supporting 37 research projects at 31 institutions throughout the United States. As we review all our research programs, we funded slightly over 4 million dollars of projects in the last 2 years. That amount aligns with our contributions, thus meeting our objective of investing 100% of our annual support in worthy neuroscience programs. We are proud of our ability to be good stewards of our donor dollars during the last two years.

We have included a summary of our income and major expenses and a condensed balance sheet for fiscal years 2024 and 2025. We encourage you to review our audited financial statements on our website or contact the BRF office.

The Board of Trustees and staff continue to work hard to sustain your support to fulfill our mission. As we start our 72nd year, we look forward to building our donor base and funding more researchers who are focused on improving life through innovative neuroscience research.

Sincerely,

David H. Fishburn
Treasurer

Statement of Activities and Changes in Net Assets

Highlights of Income Statement for the Years Ended June 30, 2025 and 2024

	2025	2024
Beginning Net Assets	\$ 21,163,326	\$ 19,189,308
Contributions	2,232,661	1,779,661
Interest and Dividends	583,758	471,780
Net Realized and Unrealized Gains on Investments	1,514,081	\$2,699,219
Total	\$ 25,493,826	\$ 24,139,968

Expenses

Program Services	\$ 2,753,664	\$ 2,399,733
Supporting Services	522,789	576,909
Total	\$ 3,276,453	\$ 2,976,642

Total Net Assets	\$ 22,217,373	\$ 21,163,326
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From audit conducted by Plante Moran

Statement of Financial Position

As of June 30, 2025 and 2024

Assets	2025	2024
Cash	\$ 33,026	\$ 132,985
Investments	23,140,220	21,941,591
Contributions Receivable	100,000	-
Prepaid Expenses and Other Current Assets	-	5,164
Security Deposits	5,200	5,200
Right-of-Use Operating Lease Asset	154,190	200,846
Total Assets	\$ 23,432,636	\$ 22,285,786

Liabilities and Net Assets	2025	2024
Liabilities		
Accounts Payable and Accrued Expenses	\$ 65,395	\$ 71,324
Operating Lease Liability	174,555	226,136
Grants Payable	975,313	825,000
Total Liabilities	\$ 1,215,263	\$ 1,122,460

Net Assets

Net Assets Without Donor Restrictions	\$ 20,275,021	\$ 19,192,519
Net Assets With Donor Restrictions	1,942,352	1,970,807
Total Net Assets	\$ 22,217,373	\$ 21,163,326

Total Liabilities and Net Assets	\$ 23,432,636	\$ 22,285,786
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From audit conducted by Plante Moran

Brain Research Foundation is a 501(c)(3) nonprofit organization. Our Tax ID is 36-2477928.

board of trustees



Scott P. Serota
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Norman R. Bobins
Vice Chair

David H. Fishburn
Treasurer

Douglas H. Walter
Secretary

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Robert C. Malenka, M.D., Ph.D.

Peter B. Pond

Thomas A. Reynolds III

Pictured, left to right, from top:

Scott P. Serota

Norman R. Bobins

David H. Fishburn

Douglas H. Walter

Terre A. Constantine



Honorary Board of Trustees

John D. Mabie, Chair

Gary Fencik

Diane Jastromb

Thomas Jones

Mary H. Smart

Randolph Tanzi, Ph.D.

(as of October 1, 2025)



Dr. Ishmail Abdus-Saboor
2022 BRF Seed Grant Recipients



**Brain Research
Foundation**

111 W. Washington Street Suite 1460 Chicago IL 60602 312.759.5150
theBRF.org