2014 Seed Grant Recipients

Demet Arac-Ozkan, Ph.D.
Department of Biochemistry and Molecular Biology, The University of Chicago
Structural and Functional Studies of Adhesion GPCRs in the Central Nervous System

Helen Bateup, Ph.D.
Department of Molecular and Cell Biology, University of California, Berkeley
Modeling neurodevelopmental disorders with genetically defined human neurons

Stephanie Dulawa, Ph.D.
Department of Psychiatry and Behavioral Neurosciences, The University of Chicago
Functional characterization of genes associated with Obsessive Compulsive Disorder using mouse models
Women’s Council Seed Grant Awardee

David Foster, Ph.D.
Department of Neuroscience, Johns Hopkins
High-density neural recording of dysfunctional memories in animal models of mental disease

Daniel Leventhal, Ph.D.
Department of Neurology, University of Michigan
In vivo optogenetics to distinguish learning from performance effects of dopamine on fine motor skills

Qin Liu, Ph.D.
Department of Anesthesiology, Washington University-St Louis
The Molecular and Neural Basis of Itch Sensation

Xuelin Lou, Ph.D.
Department of Neuroscience, University of Wisconsin
The nanometer-scale organization and function of phosphoinositide signaling at central synapses

Evan Miller, Ph.D.
Department of Molecular and Cell Biology and Chemistry, University of California, Berkeley
Optical Integrators for Monitoring Activity in Circuits and Cells

Wei Min, Ph.D.
Department of Chemistry, Columbia University
Optical imaging of new protein synthesis in live neurons and brain tissues

SungWoo Nam, Ph.D.
Department of Mechanical Science and Engineering, University of Illinois, Urbana-Champaign
Gel-like Nano-devices for Non-invasive, Electrical and Chemical Recording of Neural Activities

Julie Sigenthaler, Ph.D.
Department of Pediatrics, University of Colorado, School of Medicine
Activation of fibrotic scar forming cells following traumatic brain injury
Associate Board Seed Grant Awardee

Susan Voglmaier, Ph.D.
Department of Psychiatry, University of California, San Francisco
A Novel Approach to Regulate Glutamate Signaling in Neuropsychiatric Disease

Clarissa Waites, Ph.D.
Department of Pathology and Cell Biology, Neuroscience, Columbia University
Regulation of neurotransmitter release and synaptic vesicle recycling by protein ubiquitination
Jacob Jameson Huzenis Memorial Seed Grant Awardee

Eugene Yeo, Ph.D.
Department of Cellular and Molecular Medicine, University of California, San Diego
Global analysis of transcriptome diversity at the single-cell level in human neurons
Established to help innovative neuroscience researchers gather the data required to validate their hypotheses, the BRF Fay/Frank Seed Grants are a critical first step in understanding neurological disorders. Since 1981, BRF has awarded more than $10.8 million to fund early stage research focused on novel ideas. By enabling scientists to generate the preliminary data required for major grants, the Foundation conservatively estimates that its investments have led to a factor of twenty times more funding for grantees and research.

We continue to receive many extraordinary proposals from across the country. This year, we funded fourteen innovative projects. Three are highlighted on these pages.

Model experimental systems, such as mice, are often used to investigate the mechanisms of neurological disease. However, it would be ideal to examine the causes of disease and test potential therapeutics in a human cellular context.

Helen Bateup, Ph.D., assistant professor in the department of molecular and cellular biology at the University of California, Berkeley is utilizing a “disease-in-a-dish” approach based on state-of-the-art technology to transform skin cells obtained from patients into human brain cells, or neurons. These neurons retain the genetic information of the patient from which they were derived allowing her lab to investigate disease mechanisms in a clinically relevant context. In Dr. Bateup’s seed grant proposal, she intends to use this system to investigate how mutations in genes that cause the autism and epilepsy-related disorder Tuberous Sclerosis Complex (TSC) affect the ability of neurons to communicate with each other, and how altered neuronal communication leads to imbalanced neural network activity. In addition to revealing the causes of brain dysfunction in neurodevelopmental disorders, her future studies will test the ability of potential therapeutics to restore normal patterns of activity directly in patient-derived neurons.

Understanding the neural basis of mental diseases such as schizophrenia and autism is a major challenge in neuroscience.

One major roadblock is the lack of basic understanding of how neural circuits contribute to the cognitive processes that are impaired in these diseases. A recent focus in patient populations has been on the “default mode network” of brain areas such as prefrontal cortex and hippocampus that are particularly active during quite rest and free thinking. Such areas exhibit marked impairments in patients. Interestingly, activity in the default network is associated with high-level cognitive functions such as episodic memory, imagination, and consideration of the perspectives of others, thus providing a framework for understanding the neural basis of diseases such as schizophrenia and autism.

David J. Foster, Ph.D., assistant professor in the department of neuroscience at Johns Hopkins University, will investigate how this activity is disrupted in models of cognitive disease, and probe possible molecular mechanisms for this disruption. He will further use powerful genetic techniques to gain experimental control over these activity patterns in the brain. These studies will yield fundamental insights into mechanisms of high-level cognition, with the potential for developing and testing therapeutic interventions for cognitive disease.
Researchers from institutions across the nation have received Seed Grants from the BRF to propel their work. As we continue to fund the best science, wherever it’s taking place, we look forward to adding to this list.

Columbia University
Duke University
Harvard University
Johns Hopkins
Massachusetts Institute of Technology
Northwestern University
Rosalind Franklin University
Rush University
The Salk Institute for Biological Studies
The University of Chicago
University of California, Berkeley
University of California, San Diego
University of California, San Francisco
University of Colorado
University of Illinois, Urbana-Champaign
University of Illinois, Chicago
University of Pennsylvania
University of Michigan
University of Wisconsin
Washington University in Saint Louis
Yale University

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Traumatic brain injury is a growing cause of acquired cognitive disability in the US. Considerable progress has been made to understand how the brain responds to traumatic brain injury yet one aspect has not yet received much attention.

Following a blow to the head, the area of brain that is directly injured begins to die and, as a result, is filled by different types of cells. In other types of brain injury like stroke, some of these cells make a “scar” within the dying brain tissue much like the scar that forms after you cut your hand. At this point, it is not known if the scar helps or hinders brain recovery.

Julie Siegenthaler, Ph.D., assistant professor in the department of pediatrics at the University of Colorado, is trying to uncover what exactly a brain “scar” achieves. In her proposal, Dr. Siegenthaler plans to look carefully to see if these cells are actively making this scar in laboratory animals after a head injury. By understanding more about these cells we can determine if the scar-forming cells should be helped or stopped to better support brain healing after traumatic brain injury.

Our Associate Board chose Julie Siegenthaler’s seed grant to fund, due her connection to the department of pediatrics at the University of Colorado. The mission of the Associate Board of the BRF is to fund grants and that focus on the diseases and disorders of children and adolescents. This is the third year that the Associate Board has raised the $50,000 to fund a seed grant in its entirety.

“...If we want neuroscience research to progress—if we want new findings in epilepsy or Alzheimer’s disease, stroke, multiple sclerosis—then it requires an investment. The BRF’s investment is small. But I’ve been able to turn that small investment into a ten-fold increase in the amount of money that’s available to do our research. When you’re successful in translating this into further funding and expanding our investigation, it’s really a ten-to-one matching system.***”

Dane Chetkovich, MD., Ph.D.
Associate Professor of Neurology
Northwestern University
2009, 2010, 2012 Seed Grant Recipient

***Note: As the BRF continues to track our grantees we have found that overall our return on investment is actually 20 to 1.

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BRF Lab Notes

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