

Discover!

news from Brain Research Foundation

From the Lab to the Patient

Changing the lives of patients with paralysis



In 2002 Dr. Nicholas Hatsopoulos, Department of Organismal Biology and Anatomy at The University of Chicago, was awarded his first \$25,000 seed grant. His lab set out to understand the basics behind how neurons in the motor cortex controlled reaching movement. In 2008, his project expanded, with the help of an additional \$25,000 seed grant to examine more complex tasks.

Dr. Hatsopoulos and his team were very productive and generated extremely interesting results. The results were included in new research proposals to obtain larger, outside grants, totaling \$4.2 million. The additional support enabled him to continue his line of work and to collaborate with other scientists.

It has been over 15 years in the making but the early research that BRF supported in 2002 is changing the lives of patients with paralysis of their arms and hands.

Dr. Sliman Bensmaïa, also in the Department of Organismal Biology and Anatomy at The University of Chicago, studies the sense of

touch and has worked with a team at the University of Pittsburgh to create a prosthetic arm that is controlled or moved by the mind and enables the patient to regain sensation of touch through its hand which was achieved in one patient. The goal now is to combine the Bensmaïa's expertise on somatosensory research with Hatsopoulos' expertise of motor neuroscience to expand on this initial success.



A prosthetic arm, controlled by his mind, enables a patient to regain the sensation of touch. Photo ©UPMC and University of Pittsburgh

The National Institutes of Health (NIH) recently awarded a \$7 million grant to expand and improve prosthetic control. This grant combines the efforts of The University of Chicago team with a team from the University of Pittsburgh Medical Center. Each institution plans to recruit two or more patients with paralysis of their arms and hands to participate in the trial. The patients will be outfitted with a robotic neuroprosthetic arm and electrodes will be implanted in *(please turn to page 7)*

Dear Friends,

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Brain Research Foundation (BRF) has a long history of funding cutting-edge neuroscience, contributing close to \$50 million to innovative research. This longevity would not be possible if it weren't for the various relationships we have established—with scientists, trustees and donors. Some relationships, like families that started giving in 1958, have lasted over six decades. Others, like the Kimberly Anne Wilson Foundation that had a recent fundraiser and donated to BRF, are but weeks old. All are important.

We are extremely enthusiastic about our recently established Young Leadership Board that has been raising awareness and raising funds to support BRF and our research grant programs. We are thrilled that this next generation of supporters is playing a big part in helping us engage a new audience through their many events, including the annual "Let's Put Our Heads Together" (page 5). We look forward to seeing their continued success.

In addition to donors, another part of BRF's success is creating wonderful relationships with scientists across the country. Both our hundreds of grantees and the very important group of world-renowned scientists, BRF's Scientific Review Committee (SRC), ensure BRF's commitment to advance discoveries that will lead to novel treatments and prevention of all neurological diseases.

The SRC takes its job very seriously, identifying the best projects that will generate results and increase our understanding of the brain and nervous system. We are extremely pleased to introduce several distinguished neuroscientists as the newest members of the Committee (page 6). We look forward to working with them to support the research that will bring discoveries closer to patients. As mentioned in our cover story, the grants we award are very successful and we have the SRC to thank for their excellent work.

We want to thank all of you that have donated to BRF. You are funding innovative research that is uncovering mysteries contained within an amazingly complex organ—the brain. Your donations are having an impact on scientific discoveries right now. And the relationships we have established, and the ones we are establishing, will enable BRF to continue its mission into the future through planned giving. Planned giving is a charitable option for everyone, regardless of financial circumstances. A planned gift, no matter what its size, will help fund scientific discoveries that will lead to a more complete understanding of the brain. We hope that many will help us with our mission while preserving an important legacy.

We are proud of the revolutionary work we accomplish, and grateful for your partnership in making it happen.

Sincerely,

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

You're funding innovative research that is uncovering mysteries contained within an amazingly complex organ—the brain



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Invest in the Future

A plan for today, a promise for tomorrow

Tomorrow's results are created by our donors today. In addition to supporting our mission with yearly gifts, many people realize the importance of making a planned or legacy gift. They know how important it is to fund neuroscience and basic research because they understand that without the pursuit of science, treatments and cures will never come to fruition.

There are few things more meaningful than when we discover that someone has included Brain Research Foundation in their estate plan and we are honored to continue to serve their wishes.

Planned Giving is a charitable option for everyone, regardless of financial circumstances. A gift made as part of your overall financial estate plan can provide benefits to you now, and benefit Brain Research Foundation later.

There are numerous options for support no matter the size of your estate. Traditional Planned Giving strategies include:

- Cash Bequests
- A Gift of Property
- Retirement Plan
Name or designate BRF as a beneficiary of your IRA, 401(k), or other qualified plan.
- Contingent Bequest
A bequest that is given only in the event of the death of other beneficiaries.

- Charitable Remainder Trust
A tax-exempt irrevocable trust that generates a potential income stream with the remainder of the trust (after dispersing to other beneficiaries) going to BRF.
- Charitable Lead Trust
A tax-exempt irrevocable trust that provides financial support to BRF with the remaining assets eventually going to beneficiaries.
- Remainder Interests (Real Estate)
A donation of a remainder interest in a home or other real estate, will provide you with a current income tax deduction for the value of the remainder interest donated.

A planned gift will allow you to support what means the most, not just now, but also beyond your lifetime while offering you and your heirs significant tax benefits. Once you have provided for loved ones in your will, please consider including a gift to BRF.

Your legacy will provide the boldest and brightest neuroscientists the ability to do innovative research which will help uncover the mysteries of the brain, with the ultimate goal of identifying new treatments and cures.

If you've already included BRF in your Estate Plan we would love to know. Please contact Director of Philanthropy, Sandra Jaggi, at sjaggi@theBRF.org or (312) 759-5150.

Always seek advice from an accountant or attorney when establishing a Planned Gift.



Once again, BRF has been designated a Four Star Charity.

Four Stars from Charity Navigator means Brain Research Foundation is consistently managed with best practices in place, exceeding nonprofit industry standards.

YOUR GIFT WILL HELP BRF FUND THE MOST COMPELLING ISSUES IN NEUROSCIENCE RESEARCH. THESE ARE JUST SOME OF THEM.

ALS
ALZHEIMER'S DISEASE
ANXIETY DISORDERS
AUTISM
BIPOLAR DISORDER
BRAIN ANEURYSM
BRAIN TUMORS
CEREBRAL PALSY
DEMENTIA
DEPRESSION
DRUG ADDICTION
EATING DISORDERS
EPILEPSY
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MENINGITIS
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MULTIPLE SCLEROSIS
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Discovery Dinner

Over \$725,000 raised to support the nation's most promising neuroscience research

On November 14th over 175 guests attended the 2018 Discovery Dinner at the Ritz Carlton, chaired by BRF Trustees, Dr. Richard A. Chaifetz, Wilbur H. Gantz, David D. Olson, and Board Chair Peter B. Pond. Master of Ceremonies Rob Johnson, of CBS 2 News presided over the program.

One of the reasons our guests look forward to the event is the timely and informative presentation.

This year's presentation was *The Opioid Epidemic: Advancing the Path to Treatment and Recovery*. The panel was moderated by Dr. Terre A. Constantine and included the following experts: Dr. Amanda Persons, Rush University Medical Center; Dr. Roger Sorensen, National Institute on Drug Abuse, National Institutes of Health; and Dr. Pamela Vergara-Rodriguez, Cook County Health & Hospitals System.



From left: John Krehbiel and Karen Gray-Krehbiel, BRF Executive Director and CEO
Dr. Terre A. Constantine, Virginia Bobins and BRF Trustee, Norm Bobins.

Dr. Joanne C. Smith, President and CEO, Shirley Ryan AbilityLab and recipient of The Dr. Frederic A. Gibbs Discovery Award for Philanthropic Leadership, presented by David D. Olson, BRF Trustee.



Pictured, above, from left: Dr. James A. Mastrianni, Professor of Neurology & Director, The University of Chicago Memory Center and recipient of The Dr. Frederic A. Gibbs Discovery for Scientific Achievement, presented by Thomas A. Reynolds III, BRF Trustee.

Mr. and Mrs. Jonathan Glick, Linda Conviser Glick, Joel Jastromb and BRF Trustee Diane B. Jastromb, Emily Jastromb.

Pictured left, from left: BRF Trustee Dave Purcell and Stacy Purcell, Philip and Anne Purcell.

Young Leadership Board Member Myles Kaluzna and Stephanie Kaluzna.

Young Leadership Board

Young Leadership Board raise over \$70,000 at third annual “Let’s Put Our Heads Together” for Brain Research Foundation

On October 4th the Young Leadership Board of BRF hosted its third annual “Let’s Put Our Heads Together” for Brain Research Foundation at The Montgomery Club. Over 200 colleagues, friends and supporters attended and together they raised over \$70,000 to fund neuroscience research.

Chris Borland was the guest speaker of the evening. Chris was All-American Linebacker and Big Ten Defensive Player of the Year for the Wisconsin Badgers in 2013 and drafted to the NFL for the 49ers. Once labeled “the most dangerous man in football” by ESPN, Chris stunned fans by walking away from the NFL in 2015 at the age of 24 amid

At 24, Chris stunned fans by walking away from the NFL amid concerns over degenerative brain conditions

concerns over degenerative brain conditions like chronic encephalopathy (CTE). Borland said he’s had two diagnosed concussions and played through another in training camp his rookie season in the NFL. He subsequently underwent a clinical evaluation with UCLA researcher Christopher Giza that found, according to Borland, he likely had suffered a dozen concussions of similar severity over his lifetime, about eight of them related to football.

Chris spoke candidly about his time in the NFL, his decision to leave and how his newest passion of meditation has enabled him to find peace and serenity in his life and career.



From left: Joseph Shapiro, YLB Co-Chair, Chris Borland, Former NFL Player, Lauren Mandel, YLB Co-Chair and Jon Shapiro, YLB Vice Chair.

Brain Research Foundation Young Leadership Board

Lauren Mandel, *Co-Chair*
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Young Leadership Board celebrating their success at the 2018 Let’s Put Our Heads Together event.

Photos by Bob Carl

Lab Notes

The Brain Research Foundation Scientific Review Committee (SRC) is made up of well-regarded researchers in the field of neuroscience.

This committee lends their scientific expertise when reviewing the various research proposals submitted to the Foundation, evaluating proposals and making suggestions for funding.

BRF Scientific Review Committee

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

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University of Iowa

Tracy L. Bale, Ph.D.
University of Maryland School of Medicine

Monica J. Carson, Ph.D.
University of California, Riverside

Yamuna Krishnan, Ph.D.
The University of Chicago

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

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

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

We Welcome These Distinguished Researchers to BRF's Scientific Review Committee



Tracy Bale is a Professor of Pharmacology at the University of Maryland School of Medicine and Director of the Center for Epigenetic Research in Child Health and Brain Development (CERCH).

She obtained her Ph.D. in Neurobiology from the University of Washington, and completed her postdoctoral training with Dr. Wylie Vale at the Salk Institute. Prior to UMSOM, Dr. Bale was a Professor of Neuroscience at the University of Pennsylvania, where she also co-directed the Penn Center for the Study of Sex and Gender in Behavioral Health.

Dr. Bale is respected for her research on stress as a risk factor for neurodevelopmental disorders and neuropsychiatric disease. Her lab has developed mouse models to study vulnerability to stress dysregulation, assessing sex-specificity, developmental timing, and epigenetic mechanisms involved in programming of the brain, placenta, and sperm in response to stress. Recently, Dr. Bale has focused on bridging basic and clinical research, translating her work on epigenetic markers in the sperm, and collaborating with Dr. Neill Epperson to mechanistically examine the impact of early life adversity on neuropsychiatric disease in women.



Yamuna Krishnan has been Professor at the Department of Chemistry at the University of Chicago since 2014. She received a Ph.D. in Organic Chemistry in 2002 from the Indian

Institute of Science, Bangalore and was an 1851 Research Fellow at the University of Cambridge, UK. Her research group pioneered the use of DNA-

nanotechnology to study living cells and taking DNA-nanotechnology into the world of precision medicine. Selected honors include the Infosys Prize for Physical Sciences in 2017, the Shanti Swarup Bhatnagar Award, the Innovative Young Biotechnologist Award, the INSA Young Scientist Medal, the Wellcome-Trust DBT Senior Research Fellowship and the YIM Boston Young Scientist Award. She was featured on Cell's top 40 under 40 of scientists that are shaping current and future trends in Biology and the LSDP's Top 100 Global Thinkers of 2014.



Gordon M. G. Shepherd is an Associate Professor in Physiology, Feinberg School of Medicine, Northwestern University, Chicago. His research interests are in understanding the functional

organization of cortical circuits mediating volitional movements. Dr. Shepherd studied biology at Vassar, received M.D. and Ph.D. degrees from Harvard, trained in internal medicine and neurology at Massachusetts General Hospital, and undertook post-doctoral studies at the University of Oslo and Cold Spring Harbor Laboratory. He has also been a visiting scientist at the Marine Biological Laboratory and Janelia Farm Research Campus. At Northwestern, his laboratory focuses on dissecting cortical and other circuits, for example by using lasers and single-cell recordings to measure connections.

2019 Scientific Innovations Awards Target Cognition and Neurodevelopment Disorders

Brain Research Foundation awarded our ninth annual Scientific Innovations Awards (SIA), a grant program that provides funding for innovative science in basic and clinical neuroscience. Two well-respected scientists were selected to receive the two-year grants, totaling \$150,000 each.

The SIAs were established to provide funding and support for creative, exploratory, and cutting edge neuroscience in recognized research laboratories under the direction of established investigators.

Following are summaries of their investigations.

Vikaas S. Sohal, Ph.D.

University of California, San Francisco

Do dopamine signals promote flexible behavior by recruiting synchronized brain rhythms?



Problems with cognition are the major cause of disability in schizophrenia. One idea is that these result from having too little dopamine in a part of the brain called the prefrontal cortex. Another

idea is that abnormalities in a particular class of neurons called parvalbumin interneurons, and the brain rhythms that these neurons generate (gamma oscillations), contribute to cognitive problems in schizophrenia. We have developed new methods for measuring gamma oscillations in parvalbumin interneurons while mice perform cognitive tasks. We will now use these methods to test our hypothesis, that dopamine signals in the parvalbumin interneurons trigger gamma oscillations at critical moments during tasks.

Gamma oscillations may help the brain learn new behaviors in order to adapt to a changing world. Besides providing insight into how our brains normally learn, this could reveal a “missing link” between two factors which contribute to cognitive problems in schizophrenia. This could lead to the development of drugs which target dopamine receptors in parvalbumin interneurons in order to treat schizophrenia.

Michael E. Talkowski, Ph.D.

Harvard Medical School

Does the three-dimensional organization of the genome hold new insights into neurodevelopmental disorders?



The DNA contained within each cell of the human brain is folded in a highly organized manner. This folding pattern allows for 3D interactions between regions of the genome that control

the regulation of genes critical for the developing brain. Over the last several years, it has become clear that disruptive mutations within specific genes can lead to neurodevelopmental disorders (NDDs). While the negative impacts of gene mutations are becoming more well understood, characterizing the effects of disruptions to 3D genome folding represents one of the next broad challenges in human genetics and genomics. Our proposal will use new genome editing technology in highly specialized human neural model systems. We will create mutations both within genes known to drive NDDs and positions critical for proper 3D folding in relation to those genes. This work will determine whether disruptions to 3D genome folding has the same degree of negative impact as mutations within genes known to drive NDDs. Understanding the impact of structural rearrangements of the genome with respect to 3D folding has significant implications for genetic diagnostics and precision medicine.

Changing Lives

(continued from cover)

the brain areas that control movement and sense of touch. The data that is gathered will be used to refine movements and dexterity into the prosthetic.

It has been over 15 years in the making but the research that BRF supported back then in 2002 is changing the lives of patients with paralysis of their arms and hands. The ultimate goal is to create a neuroprosthetic that moves and senses just as a normal hand and arm do.

This innovative, rehabilitative treatment could be used for motor disabled patients with paralysis due to stroke or injury but also for those with spinal cord injury or ALS.



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9.19.19 Save the Date

Save the Date for the Young Leadership Board's annual fundraising event "Let's Put Our Heads Together" on Thursday, September 19. This year's event will be held at its new venue, River Roast, featuring breathtaking views of the Chicago River and skyline.

For sponsorship information, tickets or general information, please call the BRF office at (312) 759-5150.