

Discover!

news from Brain Research Foundation

BRF-funded research reveals serious implications regarding teens and marijuana

In just three short years, Dr. Tseng has multiplied BRF's \$40,000 investment nearly 50-fold by receiving a National Institute of Mental Health \$1.9 million grant to continue this research.

Parents of teenagers will find Dr. Tseng's research results especially noteworthy. They concluded that repeated cannabinoid use before 16-17 years of age may be detrimental to the adolescent brain.

Dr. Kuei Tseng, Department of Cellular and Molecular Pharmacology at Rosalind Franklin University, was awarded a BRF Seed Grant in 2012 to study the effects of cannabinoid receptor stimulation on prefrontal cortex development.

Once Dr. Tseng and his lab began to review and analyze the data to determine what the results told them, they realized they uncovered some of the mechanisms that contribute to long-lasting cognitive deficits resulting from early cannabis abuse. More specifically, repeated stimulation of the cannabinoid receptor in the brain of adolescent rodents negatively impacts the maturation of the prefrontal cortex.

What does that mean for humans? That chronic smoking of marijuana before the age of 16-17 may be detrimental to an adolescent's developing brain. There is a two to three fold increased risk of developing schizophrenia and other cognitive impairments in these children.

Parents' concern should not only be for marijuana but for the new generation of synthetic, more potent cannabinoid receptor stimulators—some of which are legal.



**BRAIN RESEARCH
FOUNDATION**
Innovate. Explore. Discover.

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Dear Friends,

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Thank you for making 2015 another remarkable year for Brain Research Foundation! As we move into our 63rd year of supporting innovative neuroscience research, I would like to reflect on some of the wonderful things that were accomplished.

I am so proud to let you know that in 2015 we contributed over \$2 million to support research and educational programs. We were able to do this because of two key stakeholders: our donors who continue to give tirelessly toward our mission and our Scientific Review Committee who diligently review all of the interesting research proposals to find the most innovative projects for BRF to support.

This year our donors were especially wonderful to the Foundation. Our annual Discovery Dinner held on October 27, 2015 was the most successful benefit in our history, raising over \$1.1 million! We want to thank all of our supporters who believe in our mission and chose to contribute.

A special “thank you” to our extraordinary Chair, Virginia Bobins, our Host Committee, our Board of Trustees and our sponsors. Because of this achievement, it enabled us to support even more pioneering research which started in January with an additional \$150,000 Scientific Innovations Award grant.

Also in October, we were thrilled to welcome over 50 neuroscientists to a BRF reception that coincided with the annual Society for Neuroscience Conference which was held in Chicago. It was a terrific opportunity to meet many new faces that are now part of the Brain Research Foundation community. With us that evening we had recipients of our grant programs—our Fay/Frank Seed Grant Program and our Scientific Innovations Award. It was marvelous to learn that night that a grantee had recently found out about additional funding totaling \$2 million that directly resulted from a project BRF first funded. BRF continues to be the “venture capitalists of brain research.” Their success is our success!

An engaged board of trustees is extremely important for a nonprofit’s vitality. In January, we were pleased to welcome our latest BRF Trustee, Wilbur H. Gantz. I look forward to working with Bill to help promote BRF and raise awareness of the groundbreaking research we fund. And Bill certainly knows a lot about research and health care from his days at Baxter, Ovation and now PathoCapital. We are extremely pleased that he has joined our board.

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

Sincerely,

A handwritten signature in black ink that reads "Terre A. Constantine". The signature is fluid and cursive, with a long horizontal flourish at the end.

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

**With your help, in 2015
we were able to fund over
\$2 million in support of
neuroscience research
and educational programs.**

Foundation Forward

Seed grant recipient's research may improve treatments for motor disabled patients due to strokes and spinal cord injuries



In 2002, Dr. Nicholas Hatsopoulos, Department of Organismal Biology and Anatomy at The University of Chicago, was awarded his first BRF Seed Grant for \$25,000. His lab set out to understand

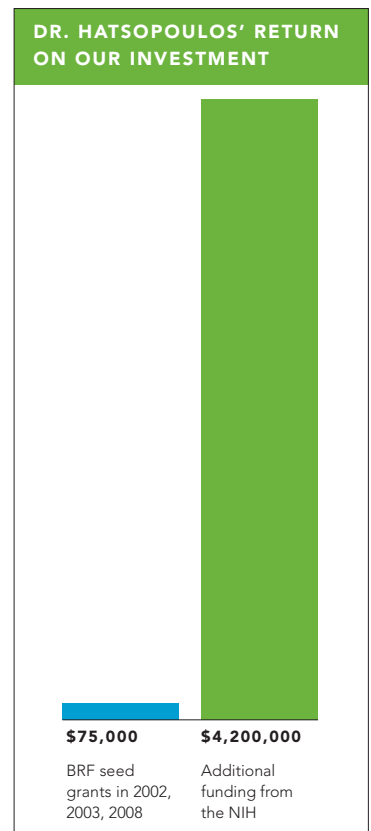
the basics behind how neurons in the motor cortex controlled reaching movement. In 2008, his project expanded his research by examining more complex tasks. The goal of this project was to understand how neurons in multiple motor cortical areas coordinated reach to grasp behavior.

Dr. Hatsopoulos and his team have been very productive, generating extremely interesting results. His lab was the first to demonstrate that kinesthetic sensory feedback enhanced the speed of getting to a visual target. That is, by mechanically moving an animal's arm to follow the visual cursor the monkey

was controlling via the motor cortex of his mind, they showed that the time it took to successfully have the cursor reach a target decreased (40% faster), than if they did not move the arm.

That result and others were published in several scientific journals, and they 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 to examine sensorimotor control of the mouth and face it, looking at feeding behavior – the movements of the tongue and jaw used in chewing and swallowing and other voluntary orofacial behaviors.

Dr. Hatsopoulos' research may lead to more effective rehabilitative treatments for motor disabled patients with brain damage due to stroke or injury. In addition, it may have direct relevance toward the development of a "thought controlled" prosthetic device by which spinal cord injury, ALS, or amputees may control reaching and grasping.



BRF chosen by Daniele Laub to receive half the proceeds of fundraising concert

Huntington's disease (HD) runs in Daniele's family and she recently tested positive for the gene.

On Saturday, January 30, hundreds of friends and family members filled Mayne Stage in Chicago for a private performance by the alternative rock band, Dishwalla, made famous by their 1996 hit, "Counting Blue Cars."

It was a touching and emotional evening that brought together people passionate about finding treatments and eventual cures to this terrible disease.

The event coincided perfectly with the distribution of one of our Scientific Innovations Awards to Dr. Jeffrey Macklis, who is using a Huntington's disease animal model to better understand how the brain is wired normally vs. how it looks in the disease.

We are honored that Daniele chose us to be the recipient of some of the proceeds from this successful event. All of the money we receive from the evening will go directly towards research.



Daniele Laub

Board News

We recently had the opportunity to sit down with the new BRF Chair, Peter Pond, for a brief interview about his long history with the Foundation. We wanted to learn more about how his passion has driven his 30+ year commitment to its mission, and what his vision is for this organization as he guides and directs the board during his two year tenure.



"It is important that the fuel and funds for our non-profit continue to be augmented by generous donors going forward."

Q Peter, tell us a little bit about your background and how you became involved with BRF:

A I grew up in Vermont and after graduate school at The University of Chicago Business School, I was hired by William E. Fay (co-founder of BRF) who was an ever-present force throughout my career at Smith Barney as an investment banker. Through my association with Bill, I became involved with Brain Research Foundation to assist in fundraising, because I specialized in advising healthcare companies in the Midwest and many of my clients were receptive. Today I spend most of my time as Chairman of Maximus, a healthcare benefits company, and aside from substantial charitable work, I do venture capital work for startup companies.

Q What is it about Brain Research Foundation that made you want to become Chairman and what are the most significant changes you've witnessed during your 30-year history as a board member?

A Most recently I attended our benefit in 2014 where we honored Bill Fay with the Founder's Award. In his remarks he mentioned that he had a hope and a vision that the BRF could double their funding and their impact on neuroscience. Since he was so instrumental in my career in investment banking, I thought it made sense that I should take up that challenge and become chair, and in becoming chair I would expand the board and increase the amount of funding making BRF a more germane force in initiating successful neuroscience research.

Q How has the Foundation changed over the past few decades?

A Many of the original driving forces including Bill Fay and Clinton Frank have largely been replaced by a younger generation. The geographic footprint of who we fund has changed dramatically and now spans coast to coast. The dollar value of what we commit to brain research every year has substantially increased.



Our new Board president, Peter Pond, has been a BRF supporter for over 30 years. Above, left, in a BRF photo from the 1980s he's pictured with Alicia Pond, Helmut Jahn, Deborah Lampe and Gwill Newman. Pictured right, with BRF Trustee John McDonough in 2003.

Q What is your personal interest in the Foundation?

A My personal interest in the Foundation really is driven by the fact that I'm almost 72 years old, and brain related disease and problems come to the fore as you age, naturally. Additionally, my mother suffered from Parkinson's disease. Generally, I have an abiding interest in all areas of brain research, simply because of my interest in healthcare, in general, through both my corporate work and banking relationships.

Q If you had only 60 seconds to describe the BRF to someone, what would you say to them?

A BRF is a 501c3 not-for-profit that funds venture capital related investments, not in new businesses but in new areas of brain research. I'm particularly impressed by the success in leveraging the initial investments we make in these projects with various scientists in terms of their ability to thereafter tap NIH and other sources by leveraging our initial investment to produce substantial further funding.

Q Where do you see the Foundation in 10 years?

A I would like to see a broadened board membership with more active participants, a substantially augmented endowment, and substantial progress in achieving our goal to advance the world's understanding of brain related diseases. My own "reward" for this effort would be to see some of our work lead to very significant alleviation of various brain related health care issues. This area is the final frontier, and any effort we can make to advance our understanding of the brain is exciting and certainly worthwhile.

Q What would you like to say to the generous donors (some of whom have been giving since 1958!) that are reading this newsletter?

A Obviously, it is important that the fuel and funds for our non-profit continue to be augmented by generous donors going forward, because the complexity of the brain and various issues that continue to confound scientists require substantial funds to probe the mysteries of our brain. And without our supporters, we simply would not be able to continue to pursue our mission and seek to find the treatments and cures of debilitating neurological conditions. So to them I send my sincerest thanks.

BRF Welcomes Wilbur H. Gantz to our Board of Trustees

Bill Gantz is President of PathoCapital, an investor in health care companies, and chairman of Aptinyx, Inc. a research and development company in central nervous system disorders.

He has a long career in the health care field and has founded and helped finance three entrepreneurial ventures. He was Executive Chairman of Naurex, Inc. that was recently sold to Allergan. Before that, he was Executive Chairman of Ovation Pharmaceuticals, which was sold to Lundbeck and also President, Chairman and a Founder of PathoGenesis Corporation, which was sold to Chiron Pharma.

Before that he was President of Baxter International, Inc. from 1987-1992. He joined Baxter in 1966 and held various management positions, including Vice President, Europe and President, International Division prior to becoming its Executive Vice President and Chief Operating Officer in 1980.

He is currently Chairman of Aptinyx, Inc. and a director of Medgenics, Inc. He is a Member of the Board of Trustees and Chair of the Science Committee for the Field Museum. He has served on numerous boards including Chair of the Harris Financial Corporation, Gillette Company, Baxter Laboratories and W.W. Grainger, Inc. He also is a past Trustee of Princeton University.

He has received numerous awards including the Breath of Life Award from the Cystic Fibrosis Foundation and the Civic iCON Award.



"I am proud to join the board of an organization whose dedication to their mission to fund the nation's most pioneering research is unparalleled."

Discovery Dinner

On October 27, 2015 Brain Research Foundation hosted the most successful fundraiser in our 62-year history. Without a doubt, this remarkable success would not have been achieved without the extraordinary talent and passion of our event chair, Virginia Bobins.

BRF raised over \$1.1 million in one evening to fund the nation's most innovative neuroscience in the nation.

The evening celebrated the accomplishments of two remarkable individuals who believe in the mission of BRF.

Trustee **Linda Heagy** presented the Frederic A. Gibbs Discovery Award for Community Service to Ingredion Incorporated, and it was graciously accepted by **Ilene S. Gordon**, President and Chief Executive Officer. Ingredion is a legacy sponsor of Girls 4 Science, a Chicago-area nonprofit that encourages girls to pursue STEM studies and careers. They also provide financial support to many organizations in the Chicago area including American Cancer Society and American Red Cross, among others.

Wilbur H. Gantz, President and Chief Executive Officer of PathoCapital was awarded the Frederic A. Gibbs Discovery Award for Philanthropic Leadership. PathoCapital invests in health care companies. Mr. Gantz is also chairman of Aptinix, Inc. a research and development company in central nervous system disorders.

He is a member of the Board of Trustees and Chair of the Science Committee for the Field Museum.

After the awards were presented, over 300 guests enjoyed an enlightening panel discussion titled "Brain on Stress: Causes, Consequences and Coping."

One of the reasons this annual benefit is so unique is that the attendees always learn something new and interesting on a topic regarding the brain. The discussion opened with what happens in the body when one encounters stress. Then the panelists explained what it does to the body and mind. The talk closed by recommending the best way to cope with stress and questions from the audience.

It simply could not have been a more wonderful evening and we are very grateful for everyone's support of this event that will go down in BRF history as our most successful fundraiser to date.



Ilene Gordon and BRF Trustee Linda Heagy



Bill Gantz and BRF Trustee Dr. Richard Chaifetz



From left, Discovery Dinner Chair, Virginia Bobins, Linda and Bill Gantz, BRF Executive Director and CEO Dr. Terre A. Constantine



From left, BRF Trustee Norm Bobins, Susan and Rick Lenny.



Richard and Linda Price



BRF Trustee Brant Ahrens and Meg Ahrens



John and Alexandra Nichols



Past BRF Honoree Jeffrey Aronin and Lisa Aronin

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Research Report

Scientific Innovations Award Program: A Measurable Success!

In 2012, BRF established an additional grant program, the Scientific Innovations Award (SIA). Just a few years later, BRF is already able to measure its success.

To date, five SIA recipients have completed their SIA research projects. Of those five, four—80%—have already received additional funding to continue and expand their original research project. It's amazing how quickly they were able to do this. Each grant period is two years long, so it has just been about two years since the first recipients have finished their projects. And actually, two recipients who obtained additional funding just finished their research projects December 31, 2015—only two months ago.

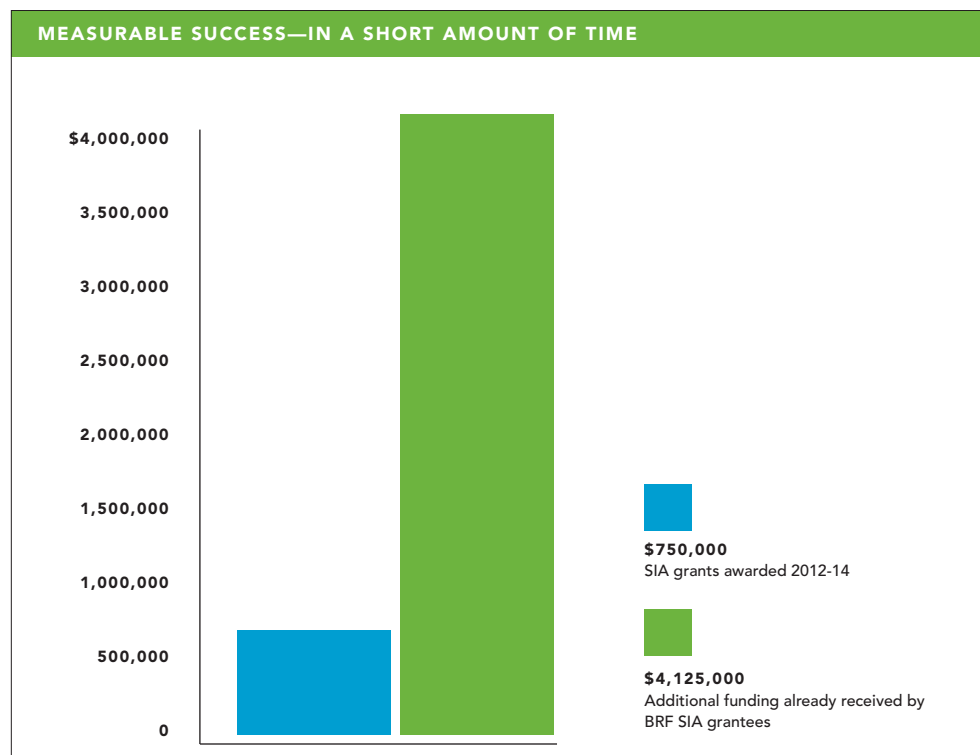
In scientific research, two years to see this kind of progress is a very short time. Two months is outstanding.

Each SIA is \$150,000, so with a total BRF investment of \$750,000 (five grants), four grantees attracted a total of \$4.125 million in outside funding. This is nearly 1:6 return on investment. And we know that more funding will follow; several of the recipients are already writing other larger grant proposals.

BRF is thrilled to be a catalyst of neuroscience, putting innovative proposals on the “fast track” to major discoveries. Our donors can be confident that we are using their contributions to maximize our understanding of the brain and that our relatively small investment is leading to high returns for science and all humankind.

We call ourselves the venture capitalists of brain research. The five grants we awarded totalling \$750,000 have generated results enabling four grantees to receive \$4.125 million in outside funding—almost a 1:6 return on our investment.

Alzheimer's, autism, ALS, epilepsy, Parkinson's and schizophrenia are among the many brain diseases and disorders that these researchers are investigating.



2016 Scientific Innovations Award Program Grants \$600,000 toward Neuroscience Research

Brain Research Foundation awarded our 5th annual Scientific Innovations Awards (SIA), a grant program that provides funding for innovative science in basic and clinical neuroscience.

This year we are extremely pleased to be awarding our largest amount yet for this program—a total of \$600,000. Four distinguished scientists were selected to receive the two-year grants for \$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.

Federal funding for exploratory research can be extremely difficult to obtain. We help fill the funding gap so break-through projects like these can get off the ground. Our goal is to facilitate the discovery of new scientific knowledge resulting in improved treatments and cures for neurological diseases.

FILLING THE FUNDING GAP: 2016 SCIENTIFIC INNOVATIONS AWARD WINNERS



Thomas Biederer, Ph.D.
Tufts University

Mapping and restoring synaptic connectivity in brain disorders

Applications: autism spectrum disorder, schizophrenia

Dr. Biederer's research focuses on how nerve cells in the brain communicate with each other through cellular connections called synapses. Synaptic abnormalities are linked to autism spectrum disorder and schizophrenia. This proposal aims to identify the underlying disease-linked synaptic changes and investigate novel interventions.



Yamuna Krishnan, Ph.D.
The University of Chicago

Dissecting microglial function in neuroinflammation by mapping nitric oxide in real time in the living brain

Applications: Alzheimer's, Parkinson's, stroke

Nitric oxide (NO), a gaseous chemical messenger, normally functions as a neuroprotective agent in the brain. However, too much NO is highly toxic and kills nerve cells. In excess amounts, NO causes neuro-inflammation leading to neurodegeneration – as seen in conditions like stroke, Alzheimer's, Parkinson's, and dementia. Dr. Krishnan's research seeks to develop improved quantitative imaging of NO to better understand its role in the brain.



Jeffrey Macklis, M.D., Ph.D.
Harvard University

Specificity and defects of neuronal circuitry in health and disease: growth cone proteomes and RNA

Applications: brain circuitry, cerebral cortex

Many devastating developmental and neurodegenerative diseases affect long-distance connection nerve cells of the cerebral cortex. The "wiring" of their circuits is performed by extending tiny structures called "growth cones" (GCs). Dr. Macklis' proposal will try to uncover some of the molecules that control each different kind of GC to build specific circuitry that makes us think, move, sense, and behave.



Fan Wang, Ph.D.
Duke University

Unravel the neuronal pathways underlying anesthesia-induced loss of consciousness

Applications: anesthesia, unconsciousness, coma

General anesthesia is a reversible, drug-induced brain state comprised of unconsciousness, amnesia, analgesia and immobility with stability and control of vital physiological systems. Yet the mechanism by which anesthetic drugs induce such a brain state remains largely a mystery. Dr. Wang's study will explore the precise neural pathways that suppress consciousness, with a potential to reveal a critical therapeutic target for restoring consciousness to patients in comas or vegetative states.

Foundation News

“Standing room only” for lectures by the nation’s most prominent researchers at our 15th Annual Neuroscience Day



Speaker Dr. Thomas M. Jessell, Columbia University

By recognizing and supporting the research conducted by graduate students and post-doctoral fellows, BRF strives to ensure that the brightest scientific minds pursue careers in neuroscience research.

Neuroscience Day 2015 began with over 30 posters presented by graduate and post-doctoral fellows at this unique forum designed to unveil new research on a number of neurological diseases and disorders. Former BRF funded neuroscientists judged the posters and determined four winners whose work was deemed to be the most innovative and comprehensive.

Following the presentations students attended a series of lectures, which, as always, were open to the public, by some of the nation’s most prominent neuroscientists in the nation. Over 150 guests heard lectures from the following scientists: Dr. Thomas Jessell from Columbia University; Dr. Azad Bonni from Washington University in St. Louis; Dr. Wei Wei from The University of Chicago and Dr. Thomas Bozza from Northwestern University. At some times it was standing room only as guests learned from these distinguished scientists about their research in topics ranging from spinal motor control to how the eye perceives motion and even how genetics can determine our sense of smell.

NEUROSCIENCE DAY WINNERS

Minsu Kang, Graduate Student
Department of Anatomy and Cell Biology,
University of Illinois at Chicago

Contribution of JNK3 in Huntington’s disease pathology

Vatsala R. Jayasinghe, Graduate Student
Department of Cellular and Molecular
Pharmacology, Rosalind Franklin University

Repeated pharmacological inhibition of the sGC-cGMP signaling pathway is equally effective as L-DOPA in ameliorating motor deficits in experimental parkinsonism

Maurizio De Pittà, Ph.D., Post-Doctoral Fellow
Department of Neurobiology,
The University of Chicago

Persistent delay activity in a neuron-glia network model

Tristan Hedrick, Ph.D., Post-Doctoral Fellow
Department of Pharmacology,
Northwestern University

Changes in hilar network physiology and connectivity in a model of temporal lobe epilepsy



Neuroscience Day winners with Dr. Terre A. Constantine, Executive Director and CEO of BRF



Dr. P. Hande Ozdinler, Northwestern University, reviewing a poster

BRF Welcomes Dr. Marina Picciotto to the Scientific Review Committee

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University of California,
San Francisco



Brain Research Foundation Scientific Review Committee (SRC) is made up of distinguished 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.

We are pleased to welcome **Dr. Marina Picciotto** to the SRC. Dr. Picciotto's expertise will continue to strengthen the committee as it searches for the most innovative neuroscience projects to support.

Dr. Picciotto is the Charles B.G. Murphy Professor in Psychiatry and Deputy Chair for Basic Science at Yale University. She is also Professor in the departments of Neurobiology, Pharmacology and the Child Study Center.

Her research focuses on defining molecular mechanisms underlying behaviors related to psychiatric illness, with a particular focus on the function of nicotinic acetylcholine receptors in the brain. Her laboratory uses knockout, transgenic and shRNA strategies to identify the role of individual receptors and signaling molecules in behaviors related to depression, addiction, cognitive function, sensory processing and food intake.

Dr. Picciotto received her B.S. from Stanford and her Ph.D. from The Rockefeller University where she worked with Dr. Paul Greengard. She conducted postdoctoral work with Professor Jean-Pierre Changeux at the Pasteur Institute before joining the faculty at Yale University. Dr. Picciotto is Treasurer of the Society for Neuroscience and serves as handling editor and on the editorial board of several journals. She is a fellow of AAAS and a member of the Institute of Medicine of the National Academies of Sciences.

Widely recognized as a mark of distinction, BRF grants are highly prized and well-regarded.

Each grant candidate is nominated by his or her academic institution.

Qualified proposals must pass a peer review process conducted by BRF's Scientific Review Committee.

The best of the best emerge through deliberation.

After the reviewers evaluate and score the proposals independently, they share their findings and reach consensus on the most deserving proposals.



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In November we received some very welcome news from Charity Navigator, America's premier charity evaluator—**BRF achieved their coveted 4-star rating.** As savvy donors demand more accountability and

transparency from the charities they choose to support, Charity Navigator evaluates the work of efficient, ethical and open charities. Receiving four stars out of a possible four stars "indicates that your organization adheres to good governance and other best practices that minimize the chance of unethical activities and consistently executes its mission in a fiscally responsible way."

The unique internal structure of the BRF coupled with the meticulous oversight of the Board of Trustees has resulted in this exceptional rating, one that we have always strived to achieve. Without you, our donors, we simply would not be able to achieve our mission to fund the most innovative neuroscience research. We take your trust in us very seriously and do our utmost to ensure that not a single dollar is wasted or unaccounted for. Our commitment to transparency and sound fiscal management will never waver.

Sharing this rating with you is one of the best ways that we are able to prove, to those of you that support us with your hard-earned dollars, that we will always steward your donations with the utmost of respect and appreciation.

*Source: Michael Thatcher, Charity Navigator
President and CEO letter dated November 1, 2015*