• Shaping the path to discovery
• From grantee to SRC
• Seed Grant establishes leader in neuroregeneration
nervous system. More than ever before, the work we fund neuroscience research that studies the entire brain and reinforces BRF’s mission to fund the most innovative groundbreaking. And now, just four months later, we are felt that Dr. Datta’s proposed project, looking at sense by this Foundation. Our Scientific Review Committee I specifically mention Dr. Datta because in January of Harvard Medical School, studies how the brain extracts loss of smell. Dr. Sandeep Datta, a neuroscientist at lead to anosmia (partial or complete loss of smell). If a I understand COVID-19 and develop treatments and vaccines. While we are familiar with the respiratory symptoms of COVID-19 there is a new symptom that has emerged—loss of smell. Dr. Sandeep Datta, a neuroscientist at Harvard Medical School, studies how the brain extracts smells from the environment and converts it into behaviors. As an expert in olfaction he is now researching studies aimed at preserving and promoting brain health and preventing brain disease and has played a key role in Alzheimer’s research. Without BRF’s initial investment, many projects may have been hindered or perhaps never been funded at all. The BRF Seed Grant Program has contributed $13,507,930 to extraordinary research projects. With the data BRF funding has enabled our grantees to gather, most have been able to obtain significant, larger NIH grants. To date, these scientists have generated an additional $350,035,890 to continue their impactful work. At our Discovery Dinner last fall, we honored Dr. Rudolph Tanzi from Harvard University with the Dr. Tanz has dedicated his entire scientific career to studies aimed at preserving and promoting brain health and preventing brain disease and has played a key role in Alzheimer’s research. That evening he gave our audience a plan to promote brain health and prevent Alzheimer’s disease. However, the overall message was how to keep your brain healthy. And at this time of stress and isolation, I think that this plan—called S.H.I.E.L.D— to keep physically and mentally healthy is so topical that I wanted to share it with you. It appears at the top of the facing page. I thank you for being part of the BRF community. You have my promise that we will continue to support research projects that succeed in opening future opportunities for research, collaboration and scientific advancement. --Terre A. Constantine, Ph.D. Executive Director and CEO Brain Research Foundation

Sleep 8 Hours During deep sleep night sleep amyloid production is turned down and the brain cleans itself out. Handle Stress Take 20 minutes each day to do something that relaxes you. Interact With Others (virtually, for now) Loneliness causes stress that can lead to chemical changes in the brain that kill nerve cells. Exercise Walking 8,000-10,000 steps a day helps grow new nerve cells. Learn New Things This strengthens the connections between nerve cells called synapses. Diet Nothing is better for the brain than the Mediterranean diet.

From Our Young Leadership Board

During these unprecedented and trying times, our community, our nation and our world need to come together to fight this pandemic. We need to do our best to slow down the spread as another very important community—scientists—work tirelessly to better understand COVID-19 and develop treatments and vaccines.

I specifically mention Dr. Datta because in January of this year he was granted a Scientific Innovations Award by this Foundation. Our Scientific Review Committee felt that Dr. Datta’s proposed project, looking at sense of smell and social interactions in mice with mutations linked to autism in humans (see page 7) was truly groundbreaking. And now, just four months later, we are learning sense of smell may be affected in COVID-19.

It is particularly rewarding to see Dr. Datta’s efforts being covered by the news and scientific community. Not only does it offer hope in this time of crisis, but it also reinforces BRF’s mission to fund the most innovative neuroscience research that studies the entire brain and nervous system. More than ever before, the work we fund has wide-ranging and critical implications and the case for supporting science and scientific research has never been stronger.

In this issue, we feature examples of research projects we’re funding that are making a difference in many areas of disease, including Alzheimer’s, autism, schizophrenia and potentially even heart disease and inflammatory bowel disease. The back cover illustrates how BRF is fastening science through our Seed Grant Program which provides start-up money for innovative, daring research projects.

When the opportunity to become involved with the Brain Research Foundation through the Young Leadership Board (YLB) was presented, I leapt at the chance. On the YLB, I find myself surrounded by like-minded, motivated young professionals who recognize the importance of getting involved with an organization like BRF. Importantly, the BRF leaders listen to our ideas, support us, and recognize the tremendous benefits of receiving input from young professionals.

BRF’s mission to advance neuroscience by funding breakthrough research is one that should resonate with everyone, especially young professionals. At our age, there is concern over the neurological health of aging parents and, as we begin starting families of our own, concern over our own health and that of our future children.

In my opinion, the scariest thing about neurological disorders is that we never know who will be affected with a given disorder or what the future holds for us, our friends, and our loved ones. We owe it to ourselves, our children, and our children’s children to push the understanding of the human brain forward in an effort to improve the world for future generations, just as we have reaped the rewards brought on by the efforts of the generations that preceded us.

As the scientific community has successfully developed treatments and cures for a variety of conditions, I believe we will find treatments, and ultimately cures, for all of the neurological diseases for which BRF funds groundbreaking research. Nobody can be sure how many years or decades it may take to fully understand all of these neurological diseases. However, I take solace in knowing that my peers and I have done our part to join BRF in making a positive difference in the world by supporting early stage innovative neuroscience research to help treat and eventually cure diseases and conditions of the brain and nervous system in children and adults.

--Myles Kaluzna Treasurer Brain Research Foundation Young Leadership Board

From Our Young Leadership Board

Like many people, I have had loved ones suffer from brain disorders. Through my Grandfather’s battle with Alzheimer’s disease, I witnessed firsthand the impact that a neurological disease can have on the afflicted individual and their family. Watching a loved one struggle with a disorder for which you cannot provide sufficient treatments, or any hope of a readily available cure, is a demoralizing experience. These sentiments are what motivate me to do my part in helping to alleviate the hardships faced by individuals with neurological disorders and those who support them.

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--Myles Kaluzna Treasurer Brain Research Foundation Young Leadership Board
High Impact

A BRF grant helped propel Dr. Yamuna Krishnan’s work to develop a novel device that measures brain health—and more. Now she’s giving back as a member of the Scientific Review Committee.

In 2016, Yamuna Krishnan, Ph.D., professor of chemistry at The University of Chicago, submitted a grant proposal to the Brain Research Foundation to support a daring idea. She wanted to build devices out of synthetic DNA that could be used to measure nitric oxide, a chemical messenger that plays key role in brain health.

At the time, scientists knew that excessive nitric oxide levels contribute to brain degeneration in diseases like Alzheimer’s disease, Parkinson’s disease, dementia, and stroke, but they had no way of measuring it in living cells. BRF’s Scientific Review Committee (SRC) awarded Dr. Krishnan a BRF Scientific Innovations Award (SIA) to pursue the work. Dr. Krishnan recently followed up with BRF about what’s happened since.

**Q** How did the BRF Scientific Innovations Award (SIA) help your research?

**A** The SIA award really allowed us to do bold work for which there was no precedent. That led to us publishing an impactful paper in *Nature Chemical Biology* in March of 2020 showing how our synthetic DNA technology is capable of measuring nitric oxide at subcellular resolution in living cells. The work has also led to several follow up studies.

**Q** How will this technology help scientists learn more about nitric oxide?

**A** Nitric oxide is a signaling molecule in the brain. Too much of it causes neurodegeneration and too little of cannot initiate brain cell communication and impairs normal brain function. So you can see that the amount of nitric oxide is really critical. Being able to accurately measure nitric oxide allows us to find out if it is dysregulated in many diseases and to identify ways to correct it. I can see this tool being used to study immune disorders, heart disease, and neurobiology, all of which involve nitric oxide levels.

**Q** What are the next steps for your research?

**A** Now that we have a tool for measuring nitric oxide, we can start thinking about whether we could get drug molecules to correct nitric oxide levels in the brain when they are either too high or too low. Our technology might also help in heart disease because an enzyme called nitric oxide synthase (NOS2) is dysregulated in such diseases. We can use our tool to help find molecules or proteins that are responsible for NOS2 misbehaving and develop molecules to counteract that and treat heart disease. We are also using this technology to build a diagnostic for inflammatory bowel disease (IBD) where an enzyme called nitric oxide synthase 3 (NOS3) is dysregulated in IBD. By measuring nitric oxide levels we are trying to build a test that predicts when a person with IBD will have immune flares to allow more timely treatment.

**Q** What are the implications for brain disease?

**A** Nitric oxide synthases are essential for signaling in the brain. The brain also has immune cells that interact with neurons and nitric oxide generated by these immune cells is implicated in neurodegeneration. So this work has significant implications for brain health.

**Q** After the completion of your SIA project, you were asked to the SRC, which reviews the grant proposals submitted to BRF for funding. What is it like being on the other side of the grant application process?

**A** The SRC gets such fantastic proposals. Many times I find myself shaking my head thinking ‘How on earth did our project get chosen for an SIA?!’ BRF is a prestigious funding organization and so naturally, very talented researchers apply. I really wish we had more money to be able support more of these projects. There are so many wonderful proposals we are not able to fund.

A new tool created by Dr. Krishnan gives scientists a window into neurodegenerative disorders, immune disorders, and even heart disease and IBD.
“The BRF Seed Grant was crucial in establishing us as a lab that is leading the work on neuroregeneration research. Our success has been built on that foundation.”
Our investment of $13,507,930 in Seed Grants has generated $350,035,890 in additional funding from larger institutions, such as the NIH.

For every $1 they receive from us, our grantees have gone on to secure almost $26 in future funding.

We are grateful to our Scientific Review Committee for helping us identify the most innovative and promising proposals and we thank them for their dedication to our mission.

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

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

Monica J. Carson, Ph.D.
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Daniel A. Peterson, Ph.D.
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Nenad Sestan, M.D., Ph.D.
Yale University

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