MOMENTUM

Brain Research Foundation 2016-2017 Annual Report

MOM

Our grantees are transforming our understanding of all neurological diseases and disorders

ALS (Lou Gehrig's disease)

Age-related macular degeneration (AMD)

Aggressive disorder

Alcoholism

Alzheimer's disease

Anorexia nervosa

Anxiety disorders

Aphasia

Arteriovenous malformation

Asperger syndrome

Attention deficit disorder

Autism

Batten disease

Bell's palsy

Bipolar disorder

Blindness

Brain aneurysm

Brain cancer

Brain development

Brain tumors

Bulimia

Cerebral palsy

Charcot-Marie-Tooth disease

Concussion

Conduct disorder

Creutzfeldt-Jakob disease

Dandy-Walker syndrome

Dementia

Depression

Developmental disorders

Down syndrome

Dystonia

Eating disorders

Encephalopathy

Epilepsy

Fatal familial insomnia

Fragile X syndrome

Frontotemporal lobar degeneration

Guillain-Barré syndrome

Hemifacial spasm

Huntington's disease

Learning disability

Lewy body dementia

Locked-in syndrom

Manic-depressive illness

Meningitis

Mental retardation

Migraine headaches

Motor neuron disease

Multiple sclerosis

Muscular dystrophy

Myasthenia gravis

Narcolepsy

Nicotine addiction

Obsessive-compulsive disorder

Opioid addiction and dependency

Panic disorder

Parkinson's disease

Periferal neuropathy

Pick's disease

Post traumatic stress disorder(PTSD)

Prion disease

Restless legs syndrome

Rett syndrome

Schizophrenia

Sleep apnea

Spinal cord injury

Spinal muscular atrophy

Stroke

Substance abuse disorders

Tay-Sachs disease

Tourette syndrome

Transient ischemic attack

Traumatic brain injury (TBI)

Trigeminal neuralgia

Tuberous sclerosis

ENTUM

Innovative scientists.
Novel ideas.
Cutting-edge technology.

They are all essential to transform our understanding of the brain and develop better treatments for brain diseases.

For nearly 65 years, Brain Research Foundation has built momentum in the field of neuroscience by helping the most innovative scientists get the best ideas off the ground.

Each BRF grant helps a scientist explore their boldest ideas, generate results and ideally secure more funding. More funding leads to new technology and more progress. Each advance brings the field closer to breakthroughs.

Dear Friends,

Brain Research Foundation (BRF) is the oldest organization funding neuroscience in the country. And over the decades, we have continued to support the most cutting-edge neuroscience research, funding innovative technology and capitalizing on answers that have been uncovered about the brain to increase the momentum of scientific discovery.

In our 2016-2017 Annual Report, you will learn about some of the game-changing research projects we have funded and hear donors explain in their own words why they have chosen to support the mission of BRF.

Over sixty years ago the scientific co-founder of Brain Research Foundation, Dr. Frederic Gibbs wrote "We have probed the depths of space and scrutinized the interior of the atom, but we have hardly begun to explore the universe that lies between our ears." Dr. Gibbs' foresight led to this visionary organization that focuses on the entire brain– not just one disorder.

As a scientist, I worked on areas of drug research related to depression, drug addiction and stroke. As the CEO of BRF, I have "expanded my research" and now get to take a disease-neutral approach by supporting research to uncover how the brain functions, how it is organized and how it can be repaired.

Throughout my 15 years in this position, my passion for this organization has never faltered. I wholeheartedly believe in its mission and it adds purpose to my life. Each year is a new year, filled with new innovative research ideas and new advancements in neuroscience. And BRF plays a critical role in its progress year after year.

The Foundation actively supports talented scientists who will have an enormous impact on the future of neuroscience. The pathway to scientific discovery is a challenging and lengthy process, but we are committed to taking these calculated risks because the pay-offs will eventually be new treatments and cures for neurological diseases.

Since the Brain Research Foundation's inception in 1953, the Foundation has contributed over $46 million to advance neuroscience. In fiscal years 2016-2017, we were pleased to be able to donate over $3.8 million toward brain research. By contributing to this cause, you are contributing to both an impressive history of achievements and laying the groundwork for a promising future. Our mission has never wavered and the ultimate goal remains the same - to help everyone who is struggling with devastating brain disorders.

Thank you for being part of the *momentum* to discoveries.

Sincerely,

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

I joined this board almost 34 years ago. I had a personal connection with an individual, Bill Fay, who was already a part of the organization and was very passionate about the mission. In 1983 Bill had been on the board for 25 years, and was involved with the formation of this Foundation due to his search to find a cure for seizures for his daughter.

Fast forward to 2015 when I was asked to take on the role of Chairman of the Board. I accepted, primarily due to the theme of this annual report: momentum. You see, after watching decades of progress from the research that we fund, one could not help but notice the escalating momentum in neuroscience research over the past few years. I truly felt that now was the time for me to step into this leadership role to capitalize upon the increase in scientific research of the brain.

I would like to share with you a few key highlights that keep us moving forward:

. We can once again say that 100% of contributions go directly towards research. This is due to our very lean operational costs being entirely funded by our investment income.

. On average, every dollar BRF has provided to Seed Grant recipients has resulted in more than $22 in additional funding from other sources.

Additionally, our forward momentum has attracted a new group of philanthropists and leaders with the establishment of our Young Leadership Board. They are a dynamic group of young professionals that has a passion for our mission and personal stories that they are willing to share. I look forward to watching them grow and thrive.

To my fellow Trustees, thank you for allowing me to best guide what we do and how we do it, so that we may continue to grow our influence and expand our board. Our reach will only become greater if we continue at this rate and I sincerely appreciate all of your guidance and support.

To Dr. Terre A. Constantine, thank you for continuing to build our momentum by managing all the moving pieces of the day-to-day operations including our staff. Thank you, too, to the extraordinary Scientific Review Committee, which works tirelessly, reviewing all Letters of Intent and applications to recommend the best and most pioneering research.

To our friends and donors, if you've been donating for a while, I thank you for your continued engagement and investment. If you've donated for the first time recently, then I welcome you and thank you for trusting us. I believe that together we will continue this forward momentum and one day soon we will know a world that will see the end of grave neurological conditions and that some of the important solutions can be traced directly to the science we are funding today. Thank you for joining us.

Yours Sincerely,

Peter Pond
Chairman, Board of Trustees


ACCE
myFUGE

LERATE

The next field-changing innovation is likely to come from an unexpected place. That's why BRF supports the best and brightest neuroscientists and their game-changing ideas to uncover the mysteries of the brain.

Sometimes science is as much about serendipity as it is about hard work and novel ideas. Experiments may lead to unexpected, but very important insights. A researcher may develop a technique or a technology for studying one brain disease that ends up being very useful for studying another.

That's why BRF takes an inclusive approach to studying the brain. While many charities focus on just one disease or disorder, BRF focuses on funding the most innovative scientists regardless of which area of the brain they study.

This approach allows scientists to focus on uncovering how the brain works on a fundamental level and allows successes in one area to accelerate into momentum across the field of neuroscience.

DIS

"I found this most exciting: when I was looking for funding, I saw that BRF is an organization that wants us to be brave and bold. Since we are constantly walking on the edge of a cliff, let's just be ourselves and write to them and ask if they'd be interested."

—Yamuna Krishnan, Ph.D., The University of Chicago, Department of Chemistry, BRF Scientific Innovations Award recipient.

COVER

A step up for innovators
BRF Fay/Frank Seed Grants give early career scientists a leg up on the competition. Young researchers use the grants to generate preliminary data to show that their innovative ideas can work. This has been proven to lead to additional funding.

BRF Scientific Innovations Awards provide $150,000 over two years to help established and productive neuroscience investigators sustain innovative research projects that have the potential to yield significant findings and deepen our understanding of the brain.

Private funders step up as federal funding lags
Organizations like Brain Research Foundation and other private funders are shouldering an increasing share of support for basic science research. In fact, according to a report from the National Science Foundation, 2015 marked the first time in several decades federal funding fell below half of all US funding for basic research:[1]

. Federal grants accounted for just 44% of the $86 billion spent on basic research in 2015.[1]

. In the 1960s and 1970s the US government provided 70% of funds for basic science.[1]

. Private funders are helping fill the gap, investing about $1 billion in basic research in 2015.[2]

As a result of this lag in federal investment, researchers face very stiff competition for the grants available. These grants often support the overhead of a laboratory budget. And recent data suggests a small number of elite laboratories get a disproportionately large share of the money.[3]

The stakes are highest for early career researchers because those who win the largest grants in their first attempts are likely to continue to receive a larger share of funding for years. Conversely, those with the smallest grants starting out are likely to receive a more meager share of funding.[3]

Innovative scientists are also at a disadvantage when it comes to federal funding. With limited money to award, the National Institutes of Health and other federal funders tend to choose the safest bets. They favor researchers with a long track record of successful results with a particular set of techniques. This often disadvantages scientists who are trying to pivot to using a new direction of research.

But BRF has the vision and flexibility to focus its grants on the scientists willing to take these risks and propel their fields forward.

[1] Science, Jeffrey Mervis. Data check: U.S. Government Share of Basic Research Funding Falls Below 50%. http://www.sciencemag.org/news/2017/03/data-check-us-government-share-basic-research-funding-falls-below-50

[2] Science Philanthropy Alliance. Private Funding for Basic Science Research Exceeds $1-2 billion. http://www.sciencephilanthropyalliance.org/what-we-do/news/private-funding-for-basic-science-research-at-u-s-universities-and-colleges-exceeds-1-2-billion-in-2015-news-release/. A report by the Science Philanthropy Alliance. Accessed August 28, 2017.

[3] Harvard Berkman Klein Center for Internet & Society Research Publication, Katz Yarden and Ulrich Matter. On the Biomedical Elite: Inequality and Stasis in Scientific Knowledge Production. Published July 11, 2017. Accessed August 30, 2018. https://dash.harvard.edu/bitstream/handle/1/33373356/BKC_Report_KatzMatter2017.pdf?sequence=1

Transformative Grants for Transformative Scientists

BRF Fay/Frank Seed Grants give early career scientists the boost they need to establish laboratories and test out their ideas. The Seed Grants provide **$80,000** over two years. Young investigators are then able to generate preliminary data needed to compete for larger grants from traditional funding sources.

Established neuroscience researchers compete for **BRF Scientific Innovations Awards.** Winners receive **$150,000** over two years to support research projects that may be too innovative and speculative for traditional funding sources, but still have a high likelihood of producing important findings in a very short time.

"As the Scientific Review Committee, we're trying to identify those investigators who can think big," said Scientific Review Committee member Daniel Peterson, Ph.D., Vice Chairman of the Department of Neurosciences at Rosalind Franklin University. "They see what can be done to transform the field, to move it forward."

Each year, the top universities from around the country nominate some of their brightest scientists for BRF grants. These scientists lay out their vision for how their research is going to contribute to better understanding the brain or a disease affecting the brain in a detailed research proposal.

BRF's Scientific Review Committee, which is made up of an esteemed panel of neuroscientists with diverse backgrounds, analyze these proposals. Their goal is to identify the scientists and projects with the most potential to be transformative.

The SRC considers not only the impact of a potential project on understanding the brain, but also the collateral benefits of the work that may multiply the return on investment.

So far, they've been prescient. For every dollar of BRF funding, grantees go on to earn on average $22 more in additional grants. This allows their labs to build capacity and momentum. Along the way, BRF-funded labs may train dozens of new scientists and greatly impact the field of neuroscience.

"The Seed Grants from BRF were critical to the early development of our laboratory. And the recipients this year are going to be the ones tackling the questions we couldn't imagine 20 years ago and will lead to breakthroughs in the next few decades."

—Edwin Cook, M.D., Director of the Center for Neurodevelopmental Disorders at the University of Illinois at Chicago

2016 SCIENTIFIC INNOVATIONS AWARD RECIPIENTS

AUTISM, SCHIZOPHRENIA, LEARNING, NTELLECTUAL DISABILITY

Thomas Biederer, Ph.D.
Tufts University
Department of Neuroscience
Mapping and restoring synaptic connectivity in brain disorders

ALZHEIMER'S, PARKINSON'S, DEMENTIA, STROKE

Yamuna Krishnan, Ph.D.
The University of Chicago
Department of Chemistry
Dissecting microglial function in neuroinflammation by mapping nitric oxide in real time in the living brain

NEURODEGENERATIVE DISEASES, BRAIN CIRCUITRY

Jeffrey Macklis, M.D., Ph.D.
Harvard University
Department of Stem Cell and Regenerative Biology
Specificity and defects of neuronal circuitry in health and disease: Growth cone proteomes and RNA

GENERAL ANESTHESIA, LOSS OF CONSCIOUSNESS, SLEEP

Fan Wang, Ph.D.
Duke University
Department of Neurobiology
Unravel the neuronal pathways underlying anesthesia-induced loss of consciousness

2017 SCIENTIFIC INNOVATIONS AWARD RECIPIENTS

PSYCHIATRIC DISEASES

Schahram Akbarian, M.D., Ph.D.
Icahn School of Medicine at Mount Sinai
Department of Psychiatry and Department of Neuroscience
Retrospective neurogenomics in the mouse

SCHIZOPHRENIA, AUTISM

Edward M. Callaway, Ph.D.
The Salk Institute
Systems Neurobiology Laboratories
Epigenetic mechanisms linking cerebral cortical cell types to gene expression and connectivity

PARKINSON'S DISEASE

James H. Eberwine, Ph.D.
University of Pennsylvania
Systems Pharmacology and Translational Therapeutics
Single mitochondrion analysis and engineering for human neurological disease

2016 FAY/FRANK SEED GRANT RECIPIENTS

AUTISM, SCHIZOPHRENIA, MENTAL ILLNESS

Kristen J. Brennand, Ph.D.
Icahn School of Medicine at Mount Sinai
Department of Psychiatry
Establishing a stem cell-based functional characterization of NRXN1-mutations from psychosis patients

ULTRASOUND TO ACTIVATE NEURONS, NEURAL CIRCUITS

Sreekanth H. Chalasani, Ph.D.
The Salk Institute for Biological Studies
Molecular Neurobiology Laboratory
Develop the sonogenetic method to manipulate the activity of mammalian neurons in vivo

EPILEPSY, SEIZURES

Catherine A. Christian, Ph.D.
University of Illinois at Urbana-Champaign
Department of Molecular and Integrative Physiology
Optoglial modulation of inhibition and seizure susceptibility

MENTAL ILLNESS

Yiyang Gong, Ph.D.
Duke University
Department of Biomedical Engineering
Ultrafast optical recording of spiking activity in a zebrafish neural circuit

MAGNETS TO REMOTELY MANIPULATE NEURONS, NEURAL CIRCUIT MAPPING

Ali Guler, Ph.D.
University of Virginia
Department of Biology
Next generation magneto-genetic tools for manipulating neural activity

HUNTINGTON'S DISEASE

Myriam Heiman, Ph.D.
Massachusetts Institute of Technology
Picower Institute for Learning and Memory
In vivo CRISPR screening for modifiers of mutant Huntingtin levels
(Women's Council Recipient)

SPINAL CORD INJURY

Alexander Jaworski, Ph.D.
Brown University
Department of Neuroscience
Somatosensory information processing through spinal commissural neurons

AUTISM, CORTICAL DEVELOPMENT

Kenneth Y. Kwan, Ph.D.
University of Michigan
Human Genetics/Molecular & Behavioral Neuroscience Institute
Brain somatic mutations at ASD-associated genetic loci

DRUGS OF ABUSE, DEPRESSION, SCHIZOPHRENIA

Kira E. Poskanzer, Ph.D.
University of California, San Francisco
Department of Biochemistry and Biophysics
Lighting up astrocytes: neuromodulator activation in the cerebral cortex

HUNTINGTON'S DISEASE

Melanie A. Samuel, Ph.D.
Baylor College of Medicine
Department of Neuroscience, Huffington Center on Aging
Decoding the molecular regulators of synaptic integrity

POST-TRAUMATIC STRESS DISORDER (PTSD)

Rebecca M. Shansky, Ph.D.
Northeastern University
Department of Psychology
Chemogenetic dissection of sex-specific fear circuits

AUTISM SPECTRUM DISORDERS

Oleksandr Shcheglovitov, Ph.D.
University of Utah
Department of Neurobiology & Anatomy
How does loss of SHANK3 in human neurons affect neuronal connectivity in the brain

2017 FAY/FRANK SEED GRANT RECIPIENTS

NEUROPSYCHIATRIC DISORDERS, OBSESSIVE COMPULSIVE DISORDER (OCD)

Susanne Ahmari, M.D., Ph.D.
University of Pittsburgh
Department of Psychiatry
Identifying the molecular substrates of OCD using human post-mortem brain and optogenetics in mice

AUTISM, DEPRESSION, LEARNING, MENTAL ILLNESS

Diasynou Fioravante, Ph.D.
University of California, Davis
Department of Neurobiology, Physiology and Behavior
Charting new territory: the Cerebello-amygdala circuit and its role in emotion regulation

GUT MICROBIOTA AND THE BRAIN

Elaine Hsiao, Ph.D.
University of California, Los Angeles
Department of Integrative Biology & Physiology
Dissecting molecular and cellular mechanisms for communication across the microbiota-gut-brain axis
(Women's Council Recipient)

ALZHEIMER'S DISEASE, MEMORY

Kei Igarashi, Ph.D.
University of California, Irvine
Department of Anatomy and Neurobiology
Neural circuit mechanisms in the early stage of Alzheimer's disease

ALZHEIMER'S DISEASE, TRAUMATIC BRAIN INJURY (TBI)

Terrance Kummer, M.D., Ph.D.
Washington University in Saint Louis
Department of Neurology
Traumatic synaptic injury and its impact on AD

ADDICTION, SUBSTANCE ABUSE

Ian Maze, Ph.D.
Icahn School of Medicine at Mount Sinai
Department of Neuroscience
Beyond Neurotransmission: exploring roles for synaptic dopaminylation in drug-induced plasticity

AUTISM, SCHIZOPHRENIA, NEUROPSYCHIATRIC DISORDERS

Jason Stein, Ph.D.
University of North Carolina at Chapel Hill
Genetics and Neuroscience Center
Identifying genetic influences on chromatin accessibility during human cortical development

VISION, BLINDNESS

Kwoon Wong, Ph.D.
University of Michigan
Department of Ophthalmology & Visual Sciences
Treating blindness by manipulating intraretinal melanopsin signaling

SPEECH AND LANGUAGE DEVELOPMENT DISORDERS

Michael Yartsev, Ph.D.
University of California, Berkeley
Helen Wills Neuroscience Institute, Department of Bioengineering
Neural codes for perception and production of learned acoustic elements in the mammalian brain

DVANCE

Contributions from BRF's generous donors have played a pivotal role in fueling exciting advances in the field.

Inside these pages are the stories of some of the brilliant scientists and passionate supporters and volunteers helping make this progress possible.

TRAN

"I never look at what people say; I always look at what people do. BRF has demonstrated a commitment and this is, for me, the biggest articulation of their confidence that we are doing what they had asked us to do which was be bold, be brave, be transformative."

SFORM

Dr. Krishnan's lab is working to create a way to map nitric oxide in a living brain.

Nitric oxide is one of the brain's most important chemical messengers. Too little of the chemical shuts down communication between parts of the brain, but too much nitric oxide kills nerve cells and contributes to the brain degeneration seen in diseases like Alzheimer's disease, Parkinson's disease, dementia, and stroke.

Despite recognizing its critical role in brain health, scientists have struggled to study nitric oxide in the brain because they simply couldn't see where it was produced and how much was being made in healthy vs diseased brains. It's like trying to figure out what's happening in a baseball game without being able to see the ball or bat, explained Yamuna Krishnan, Ph.D., a professor of chemistry at The University of Chicago.

But Dr. Krishnan, a 2016 BRF Scientific Innovations Award (SIA) winner, is working to change that by creating a way to map nitric oxide in the living brain. She's leveraging her lab's experience building devices out of synthetic DNA that allow scientists to track molecules called ions in living organisms.

She had a hunch that her DNA tracking devices would work for nitric oxide imaging, and the BRF SIA grant allowed her to take a chance. It also allowed her to start using zebra fish as an experimental animal instead of the simpler soil-growing worms they had used for past studies.

"BRF allowed me to go completely out of my comfort zone and take on something risky," she said.

So far, the effort has been a huge success. She has built synthetic pieces of DNA about one-tenth the size of a virus that act as chemical detectors for nitric oxide. These detectors can be sent to precise locations in the brain to report back on the concentration of nitric oxide.

"Now that we can see the nitric oxide in the brain, we can start asking what are the factors that tip normal communication between cells (arising from nitric oxide production) to a situation where you have neurodegeneration," Dr. Krishnan explained.

If scientists figure out how nitric oxide tips from normal to toxic levels, they might be able to develop ways to contain it. This could lead to treatments for many forms of dementia and stroke.

This groundbreaking new technique is the latest proof of the importance of funding interdisciplinary research to help unlock the brain's secrets. It's also why BRF is committed to funding the most innovative researchers regardless of their neuroscience focus.

"The brain uses chemistry, biology, physics and computation," Dr. Krishnan said. "Any expertise you have will provide a new inroad into understanding its processes."

She hopes that her new technique may be adapted to help scientists image all of the brain's chemical messengers. Having such a detailed map of brain communication would, for the first time, allow scientists to see in detail which brain cells are communicating and how.

"If we could see all the messengers we can create chemical maps of the brain," Dr. Krishnan said. "Without that we won't be able to understand who is talking with whom."

This cell-to-cell level detail could propel the field of neuroscience forward and lead to advances in understanding and treating many forms of brain disease–not just dementias. It's why BRF is proud to fund research on innovative techniques that drive momentum in the field.

TRA

BRF's grant gave Dr. Ahmari the opportunity to expand her research and propel her career.

The repetitive thoughts and behaviors that disable many patients with obsessive-compulsive disorder [OCD] have been traced back to hyperactivity in parts of the brain essential for making decisions and taking action. But exactly what is happening at a molecular level in these parts of the brain remains a mystery. Even basic information about which genes are abnormally turned on or off in patients is lacking.

"It's been a very understudied disease," explained Susanne Ahmari, M.D., Ph.D., assistant professor and director of the Translational OCD Laboratory at the University of Pittsburgh. But Dr. Ahmari–with the help of a 2017 BRF Seed Grant–aims to change that.

"Brain Research Foundation shares my vision as a researcher to try to accelerate mental health advancements through neuroscience."

The support is crucial as Dr. Ahmari, who joined the University of Pittsburgh in 2013, establishes herself as a translational researcher. She has already built a reputation as a successful scientist studying OCD-like symptoms in mice and the molecular changes in the brain that underlie them. Now, she's also tapping into her strengths as a physician and a practicing psychiatrist to simultaneously study the disease in humans.

"Straddling that interface between basic and clinical neuroscience–especially when you are a new investigator–is pretty risky," she explained.

With BRF's support Dr. Ahmari is tapping into the University of Pittsburgh's collection of brain tissue and its staff's expertise to carefully map all the genetic changes in people with OCD. She will then study if these same genetic changes occur in strains of mice with OCD-like symptoms.

"I'm not sure I would have been able to initiate the project without it," she said. She explained that her lab had generated some exciting preliminary data prior to getting the BRF grant, but it wasn't enough data to apply for a traditional grant through the National Institutes of Health.

Dr. Ahmari and her team will also use a cutting edge technique called optogenetics to hyperstimulate select groups of brain cells or neurons in mice and observe whether it causes OCD-like behaviors in the animals.

"You can turn neurons on and off by delivering light through a fiber optic probe implanted in the mouse brain," she explained.

The results will provide new insights on how repetitive behaviors emerge. This may contribute to the development of new treatments not just for OCD, but for other neurologic and psychiatric diseases. Dr. Ahmari explained that diseases like autism, drug addiction, and Parkinson's all involve repetitive behaviors. So it's possible that similar treatments may help reduce repetitive behaviors across different diseases.

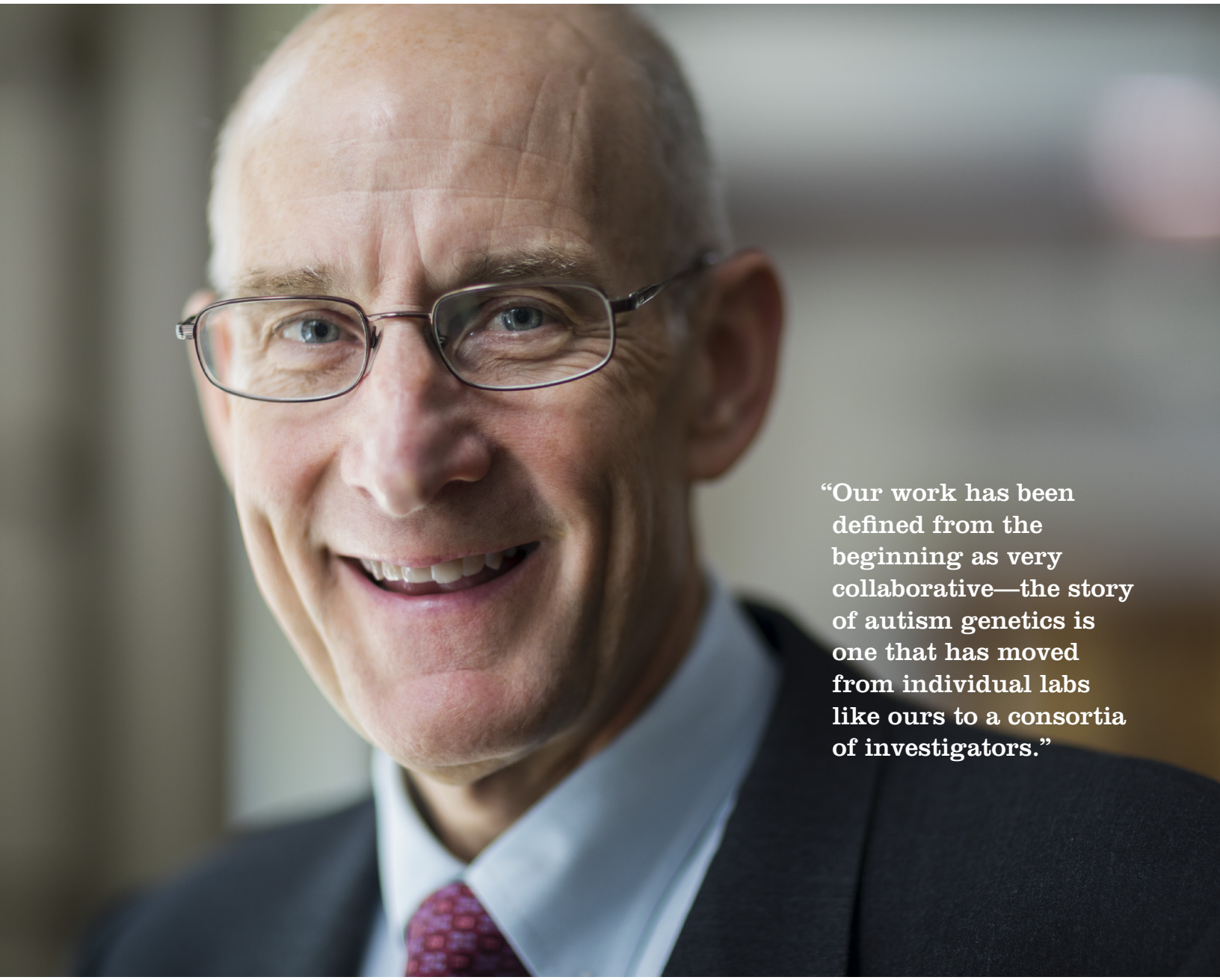
"My most fruitful lines of research have always been ones that have taken me to under-explored or unexplored areas," she said. "For me that's the way to continue momentum in the field, to continue pushing the envelope using new technologies or existing technologies to address new questions."

NSLATE

“My most fruitful lines of research have always been ones that have taken me to under-explored or unexplored areas. For me, that’s the way to continue momentum in the field, to continue pushing the envelope using new technologies or existing technologies to address new questions.”

COLLA

BRF's support of Dr. Edwin Cook's research has impacted the careers and discoveries of scientists world-wide.



"Our work has been defined from the beginning as very collaborative—the story of autism genetics is one that has moved from individual labs like ours to a consortia of investigators."

BORATE

Like a tiny seed that grows into a tree, a small BRF Fay/Frank Seed Grant can be the start of much bigger things for researchers and their colleagues. A Seed grant can help a researcher tap into additional funding. It can help a lab grow into using new techniques and tackling new challenges. And, it can help train young scientists who may one day branch out and start a lab of their own.

No one demonstrates the momentum-building power of a seed grant better than Edwin Cook, M.D., Director of the Center for Neurodevelopmental Disorders at the University of Illinois at Chicago. In the 1990s Dr. Cook, who at the time was an assistant professor at the University of Chicago, received four small seed grants totaling $46,800.

The first BRF grant helped Dr. Cook set up his lab, which was focused on using neurochemical techniques to study why children with autism have very high levels of serotonin in their blood platelets.

A few years later, when he wanted to shift from using neurochemical techniques to using genetic tools a second BRF Seed Grant made it possible. To make progress in clinical or translational research, it is often imperative to pursue new ideas or to switch gears to new techniques, Dr. Cook explained.

"The next steps are not always what you thought they would be a few years before," he said. "You shift to where the opportunities are."

Dr. Cook's pivot to exploring the genetic basis of excess serotonin in children with autism has contributed to an overall shift in autism research toward collaborative research approaches that consider the contribution to autism of many genes.

Not only has Dr. Cook and his laboratory been influential in the field of autism research, publishing more than 230 articles in scientific journals, he has managed to grow and sustain his lab with more than $14.5 million in additional grants since receiving his BRF funding.

Dr. Cook has trained dozens of undergraduate, medical, and graduate students expanding the impact of those small seed grants to a new generation of researchers. Some have gone on to create labs of their own, including Jeremy Veenstra-VanderWeele, M.D., an endowed professor and Director of Child and Adolescent Psychiatry at Columbia University and Suma Jacobs, M.D., Ph.D., Director of the Autism Research Program at the University of Minnesota. Others have gone on to become research-savvy physicians who are well prepared to translate new findings into their practices.

"Our work has been defined from the beginning as very collaborative–the story of autism genetics is one that has moved from individual labs like ours to consortia of investigators," Dr. Cook said. Since 2007, all of the imaging, genetic, and clinical data generated by Cook and his colleagues is available for other researchers to use through the National Database for Autism Research.

This big picture genomic approach provides scientists with a large number of targets to study what happens in the brains of people with autism and to develop treatments in a more systematic way, he said. One of the things Dr. Cook is currently studying is how mutations in multiple genes may contribute to the specific set of symptoms a person with autism experiences.

None of this work and the ripple effects it has had on the field and the careers of up-and-coming scientists would have been possible without the seed funding from BRF. With help from its donors, BRF is committed to continuing to identify and support the careers of innovative researchers like Ed Cook laying the groundwork for neuroscience breakthroughs one seed at a time.

$14,590,848
ADDITIONAL FUNDING

BRF GRANTS: **$46,800**

The ripple effect BRF's support generates is exemplified by Dr. Edwin Cook. In the 1990s, Dr. Cook received BRF Seed Grants totalling **$46,800.** Using the data from those small grants, he has received an additional **$14,590,848** in funding. His findings have been published in over **230 scientific journals** and the post-docs and grad students he mentored are now principal investigators in labs across the country.

"The researchers we fund generate data, publish results, and other scientists consider how their projects may interconnect with those findings. Their post-doc fellows leverage those findings to set up their own labs, expanding on the knowledge generated.

It's a ripple effect. The research we fund is not happening in a silo. The results are disseminated beyond borders. So the work our grantees are doing is impacting research around the world."

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

CONT

Emily Golin understands the importance of philanthropy among the next generation.

Because of her personal connection, Emily finds it particularly exciting that BRF's grantee, Dr. Susanne Ahmari, is conducting research on the genetic and molecular basis of OCD. (See page 16 for more on Dr. Ahmari's research.)

RIBUTE

Like many of BRF's volunteers and donors, Emily Golin, a member of the BRF Young Leadership Board, has a personal stake in brain research. She grew up struggling with OCD but didn't receive a diagnosis until her 20s, despite seeing multiple clinicians for her symptoms. So for her, Susanne Ahmari's research on the genetic and molecular basis of the disease is particularly exciting.

"It's going to potentially allow for earlier diagnoses," she said.

Emily states that scientists are studying what's happening in the brains of people with OCD and that antidepressants can help patients manage their symptoms. But there are still many questions to answer about the genetic and molecular basis of the disease. If Dr. Ahmari and her colleagues can shed light on the specific mutations and molecular pathways involved in the disease, it could point to new ways to diagnose and treat the illness.

Joining the Young Leadership Board, which was founded in 2017, has given Emily a platform to help educate others about illnesses that affect the brain and how supporting BRF can help drive research that may one day advance care.

"It's kind of opened up this new door to start a conversation about mental health and its connection with the brain," Emily said. "I just can't tell you how amazing it feels to contribute to an organization supporting such innovative brain research."

She's so passionate that she has encouraged friends and others to get involved in BRF. In the process, she's found that many people have a personal connection with neurological diseases.

"Almost everyone has a connection to someone with a brain disease–to someone with Alzheimer's or someone struggling with depression," she said.

One of the things she likes most about BRF is that it is not solely focused on one illness or disease. This inclusive approach means that donations to BRF may help people with many different types of neurological diseases as well as help advance the field as a whole.

"It's magical how one organization can have an impact on so many areas," she said. "It presents an opportunity for you to get involved and make a difference, potentially for someone you know who is struggling."

It's particularly important for young people to get involved with supporting BRF, Emily declared. She acknowledged that sometimes people her age feel overwhelmed with work or unprepared to help. But she said contributing to progress in brain science is so gratifying that it is well worth the time.

"We are the next generation," Emily said. "We are the ones who are responsible to get the ball rolling, to create this momentum in terms of new studies, new research, new development in the field, and starting to look into areas that haven't been looked into before. This is our chance to get involved."

IMP

A tragic personal loss drives a commitment to increase understanding of mental diseases.

Losing a child is every parent's worst nightmare. But when a child is lost to suicide, family members are left with many questions. When BRF donors Deirdre Jameson and Charley Huzenis lost their son Jake, they struggled to comprehend what happened, and why: "Why would this happen to a seemingly healthy, successful young man? What could they have done differently? How could they make sure this doesn't happen to another family?"

Jake was well liked and had many friends. He had a passion for improvisational comedy, even launching a comedy troop called *Another Man's Trash* while attending Eckerd College. He had a wonderful way of making others feel special. "He would give you his full attention, his full curiosity," said his father Charley.

But Jake was struggling. He couldn't sleep and was plagued by disturbing thoughts of suicide. At first, his parents attributed his struggles to anxiety. "He felt relief when he thought about suicide; then he attempted it," said his mother Deirdre Jameson. That attempt led to treatment in two different programs and to Jake trying to use meditation to calm his mind.

"It's a disease that takes over and traps you in your own mind and you cannot break out of it," Charley said.

After four years of fighting, Jake told his parents he was tired and he'd lost his will to live. At the age of 25, Jake took his own life.

"In retrospect, what he was saying was: 'Every day I work so hard to fight these feelings and to prevent my dying and I don't have the energy to do that any more'," Deirdre said.

In the wake of Jake's death, his parents received an outpouring of support from others whose loved ones had also suffered from depression.

"It's a lot more prevalent than we recognize in society," Charley said. He worries that suicide may become even more prevalent with veterans coming home from conflicts in the Middle East with post traumatic stress disorder, the economic anxiety many Americans grapple with, and the ongoing opioid abuse crisis.

So, Deirdre and Charley funneled their energy and the outpouring of support into donations to BRF. They raised enough money to create the Jacob Jameson Huzenis Memorial Seed Grant in his honor. The grant helped researchers study the underlying molecular changes that occur in the brains of people experiencing mental illness.

"It feels like it is just the beginning of what needs to be done in science," Charley said.

Ultimately, Deirdre and Charley hope that the research BRF funds can one day help explain what happened to their son, help dispel the stigma that surrounds suicide, and prevent others from suffering the way they have.

"The pain can't even be measured and because of our experience we've seen it affect so many families," Charley said. "That's something that hopefully one day families won't have to go through."

ASSION

"Brain research is something that you feel you want to do; you want to do this because in the scope of where we are, this is going to be a large, important area for the whole world."
—Charley Huzenis

UPPORT

The generous support of BRF's donors has been a driving force in the Foundation's efforts to build momentum in the field of neuroscience. We are grateful for the passion and generosity of all our donors.

Donors to the Brain Research Foundation

(July 1, 2015-June 30, 2017)

Thank you, Brain Research Foundation friends and donors, for supporting innovation, exploration and discovery through your donations. It is only because of your ongoing support that BRF is able to continue its momentum with the goal of finding treatments and cures of devastating neurological disorders. So many individuals listed here have either experienced first-hand or witnessed a close friend of family member struggle with a disease or injury. Your belief in what we do is appreciated and never taken for granted.

Our recent and future achievements are not possible without your generosity.

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Dorene Clemons
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Erich Von der Heydt
Mr. Eric Wessman

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The Bar Method
Blowout Junkie
Blue Apron
Boka Restaurant Group
Bull + Bear
Chicago Bulls
Chicago Cubs
Chicago SUP
De Cero
Drybar
Dollar Shave Club
East Bank Club
Formento's
Goddess and Grocer
HAIR LOFT ltd
iO Theater
Jennifer Zeuner
Karen Walker
The Kitchen
The Langham
Leah Chavie
Lettuce Entertain You
Loeffler Randal
Madewell
Mara Hoffman
Parlor Pizza
Ranalli's
Revolution Brewing
Rockbit
Second City
Shred415
SoulCycle
Steppenwolf
The Tie Bar
UP Comedy Club
Vince
Virgin Hotels

★★★★
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The Foundation's 4-star rating from Charity Navigator, the most well-respected nonprofit rating organization, gives our donors confidence that their funds are being used wisely. In fact, BRF earned a 100% rating for its accountability and transparency for adhering to best practices. Our efficiency and sterling track record for good stewardship allow us to make sure every dollar of every donation goes directly to research.

We do our best to accurately recognize all of our donors. If you see an error or omission, please contact us at 312.759.5157.

Letter from the Treasurer

Brain Research Foundation continues to fund ground breaking 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 in each of the last seven years.

BRF continues to fund the most innovative neuroscience research in the most beneficial ways to advance the understanding of the brain. As we review all of our programs, we funded over $3.8 million for projects in the last two years. That amount exceeded our contributions by $1.4 million, thus meeting our objective of investing at least 100% of our annual support in worthy neuroscience programs. We are proud of our ability to be good stewards of our donor dollars.

We have included a summary of our income and major expenses and a condensed balance sheet for fiscal years 2016 and 2017. 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 65th year, we look forward to building our donor base and funding more researchers who are focused on improving life through innovative neuroscience research.

Sincerely,

Peter J. Eschenbach
Treasurer

Financial Statements

Statement of Activities and Changes in Net Assets

Highlights of Income Statement year ended June 30, 2017 and 2016

		2017		2016
Beginning Net Assets	$	13,779,270	$	15,991,361
Contributions		1,242,119		1,201,681
Interest and Dividends		486,127		540,688
Net Realized and Unrealized Gains on Investments		1,360,814		(1,172,400)
Total	**$**	**16,868,330**	**$**	**16,561,330**
Expenses				
Research and Education	$	1,631,309	$	2,211,435
General Operating		425,611		570,625
Total		2,056,920		2,782,060
Total Net Assets	**$**	**14,811,410**	**$**	**13,799,270**

Financial Statements

Statement of Financial Position
As of June 30, 2017 and 2016

Assets		**2017**		**2016**
Cash	$	40,059	$	66,557
Current Prepaid Expenses and Deposits		3,000		-
Investments		15,411,581		14,625,406
Accounts Receivable		-		9,676
Property and Equipment - Net		10,072		1,698
Other Assets		5,200		5,200
Total Assets	$	15,469,912	$	14,708,537

Liabilities and Net Assets		**2017**		**2016**
Liabilities				
Accounts Payable and Accrued Expenses	$	42,597	$	145,277
Grants Payable		585,000		780,000
Deferred Rent Expense		30,905		3,990
Total Liabilities	$	658,502	$	929,267
Net Assets				
Unrestricted	$	12,975,523	$	12,004,232
Temporarily Restricted		335,887		275,038
Permanently Restricted		1,500,000		1,500,000
Total Net Assets	$	14,811,410	$	13,779,270
Total Liabilities and Net Assets	**$**	**15,469,912**	**$**	**14,708,537**

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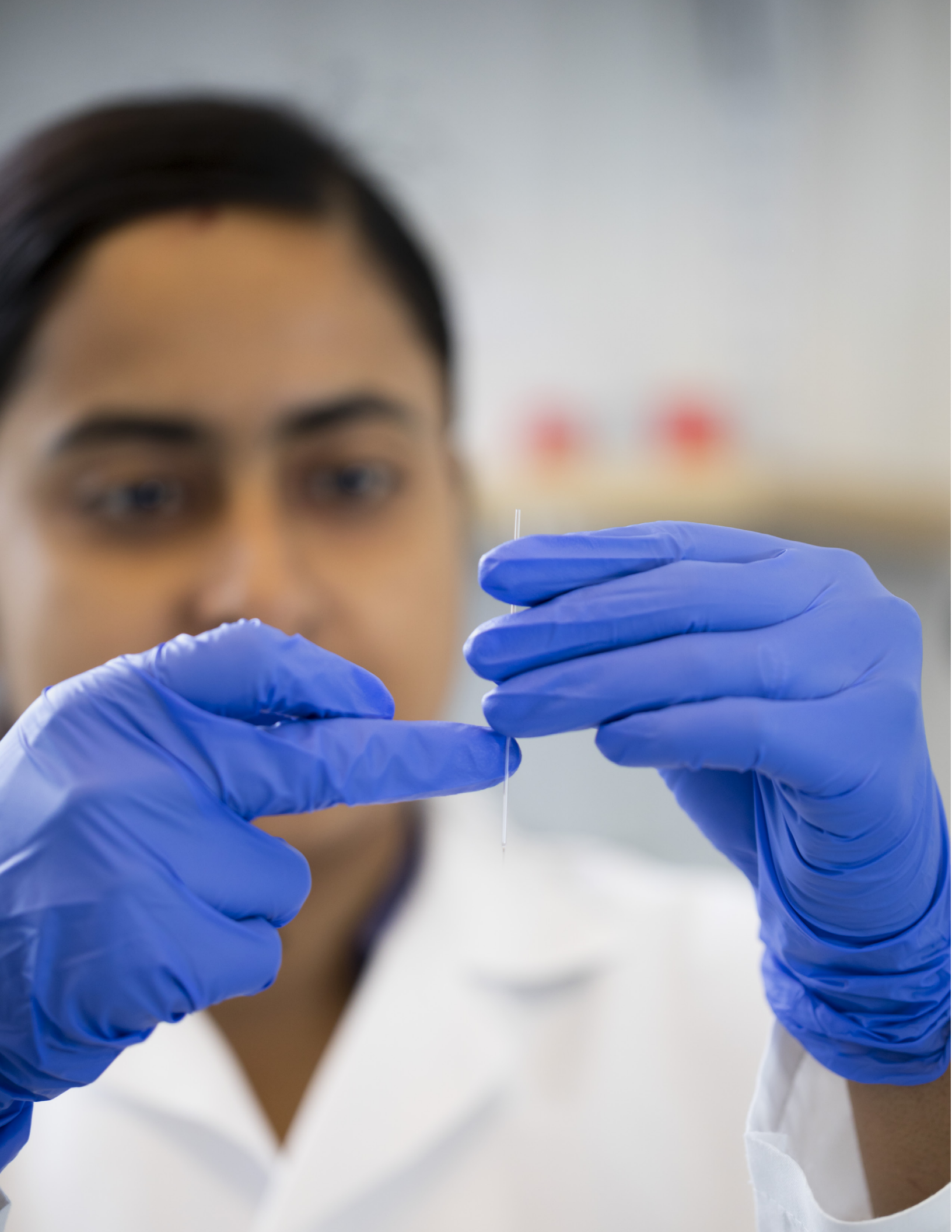

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