

2011 Annual Report

 **BRAIN &
BEHAVIOR**
RESEARCH FOUNDATION

Awarding **NARSAD** Grants

Empowering Research

for Productive Lives

Awarding NARSAD Grants

1987—2011

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**BRAIN &
BEHAVIOR**
RESEARCH FOUNDATION
.....
Awarding **NARSAD** Grants



Our Mission

The Brain & Behavior Research Foundation is committed to alleviating the suffering caused by mental illness by awarding grants that will lead to advances and breakthroughs in scientific research.



Our Credentials

Over a quarter of a century, we have awarded nearly \$300 million worldwide to more than 3,100 scientists carefully selected by our prestigious Scientific Council.



Our Vision

To bring the joy of living to those affected by mental illness—those who are ill and their families and friends.

Leadership



Leadership Report

SUPPORT THE CHALLENGE

Our new fiscal year has started with increased momentum with donation receipts for the first quarter of 2012 up over 100% from those of 2011. We are also presented with an extraordinary opportunity to expand upon this momentum. As we launch our 25th year of awarding NARSAD Grants we have been issued a challenge grant by a charitable foundation to match their collective commitment of a new \$3 million grant when we secure new and/or increased contributions from others by July 15, 2012. This generous offer compels us to enthusiastically share the opportunity which will enable us to fund our 2012 Young Investigator program for up to 200 grants. For twenty-four years, the NARSAD Young Investigator Grant program has been the driving force behind thousands of scientific achievements, many of which we are now able to share with you on our website and in our *Quarterly* magazine throughout the year.

We have faced funding challenges in recent years, and subsequently our Board decided to defer new NARSAD Young Investigator Grants from 2011 to 2012. With this exciting new commitment and the aggressive support of our community of donors, we look forward to a significant number of grants to Young Investigators, as well as sustaining other traditional funding for Distinguished and Independent Investigators in the coming year. Our projected 2012 grant schedule will bring the total awarded since 1987 to almost 4,500 grants with \$300 million in support. Each of these grants propels us in our mission to improve the lives of all those affected by mental illness.

We hope we can count on your compassionate and generous support with new or increased contributions to help us meet this wonderful new \$3 Million Challenge by July 15, 2012.

In **2011**, the results of research funded by NARSAD Grants continued to define the leading edge of research in the mental health field. From groundbreaking research moving us closer to developing reliable diagnostic tools to new early intervention techniques and more effective and rapid-acting treatments, 2011 proved to be a year of significant advancement. Please see a summary of our 2011 highlights on pages 8-9 of this report and visit bbrfoundation.org for continual updates of how our research improves the lives of those affected by mental illness.

With the completion of our 24th year of awarding NARSAD Grants, the Foundation continues to drive progress in brain and behavior science. Despite current economic uncertainty, we continue to invest 100% of donor contributions for research in NARSAD Grants. In 2011, fifteen NARSAD Distinguished Investigator Grants were awarded to exceptionally gifted scientists with particularly novel research projects. Their projects are summarized on pages 12-15 of this report.

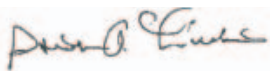
The research advances and breakthroughs could not be possible without the extraordinary volunteer effort and leadership of our Scientific Council. This prestigious group of mental health leaders steers the NARSAD Grant selection process. We are proud to report that ten distinguished experts joined the

Council as new members in 2011, bringing the total number to 132 (the new members are highlighted on page 5).

The Foundation also excelled in its commitment to public education throughout 2011. The Annual Mental Health Research Symposium in New York City was once again a full house, offering complimentary admission to hear presentations on topics spanning the mental illnesses. Ranging from the latest learning in basic research to the benefits of new technologies in accelerating our understanding of the brain, the presentations were given by the six distinguished scientists selected for Lifetime Research Achievement Prizes and six select NARSAD Young Investigator Grantees. In April and May, four research discovery events were held in different cities in Texas where NARSAD Grantees and Scientific Council Members met in small group settings with family members and patients to discuss the latest advances and their potential to increase recovery rates. Throughout the year, a series of webinars featured NARSAD Scientific Council Members presenting to hundreds of participants in an online interactive forum with live Q&A discussion.

These public events combined with ongoing innovation in communications vehicles to continually disseminate research discoveries and share personal stories of recovery. Our website was rebuilt to reflect the 'Discovery to Recovery' theme of the Foundation mission. Now organized by mental illness and updated weekly, there are research discoveries, recovery stories, and 'meet our scientists' profiles and 'ask an expert' functionality for each of the illnesses. And there continues to be the remarkably complete information available through the Schizophrenia Research Forum website the Foundation underwrites. *The Quarterly* publication brings the latest in research discoveries and patient progress and is supplemented with a steady stream of newsletters and research news updates sent to those on our email list.

We closed 2011 with great determination to overcome the obstacles facing mental health research. In this era of flourishing neuroscience, technology and brain mapping, we are closer than ever to understanding the brain and how to treat, and even prevent and cure, its illnesses. But this is happening within a context of restricted funding available for research and development. The budget of the National Institute of Mental Health has stopped growing, major pharmaceutical companies have significantly reduced their neuroscience and psychiatric research efforts and academic medical research programs, particularly those funded as part of hospital budgets or with state and federal allocations, are under pressure to reduce their activities. The need for NARSAD Grant funding has never been greater. As we enter into our 25th year of awarding grants in 2012, we urge you to join us and renew your commitment to funding the leading edge of research that will improve treatments and lives, and ultimately get us to prevention and cures for mental illness.



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Foundation Scientific Council

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Scientific Council

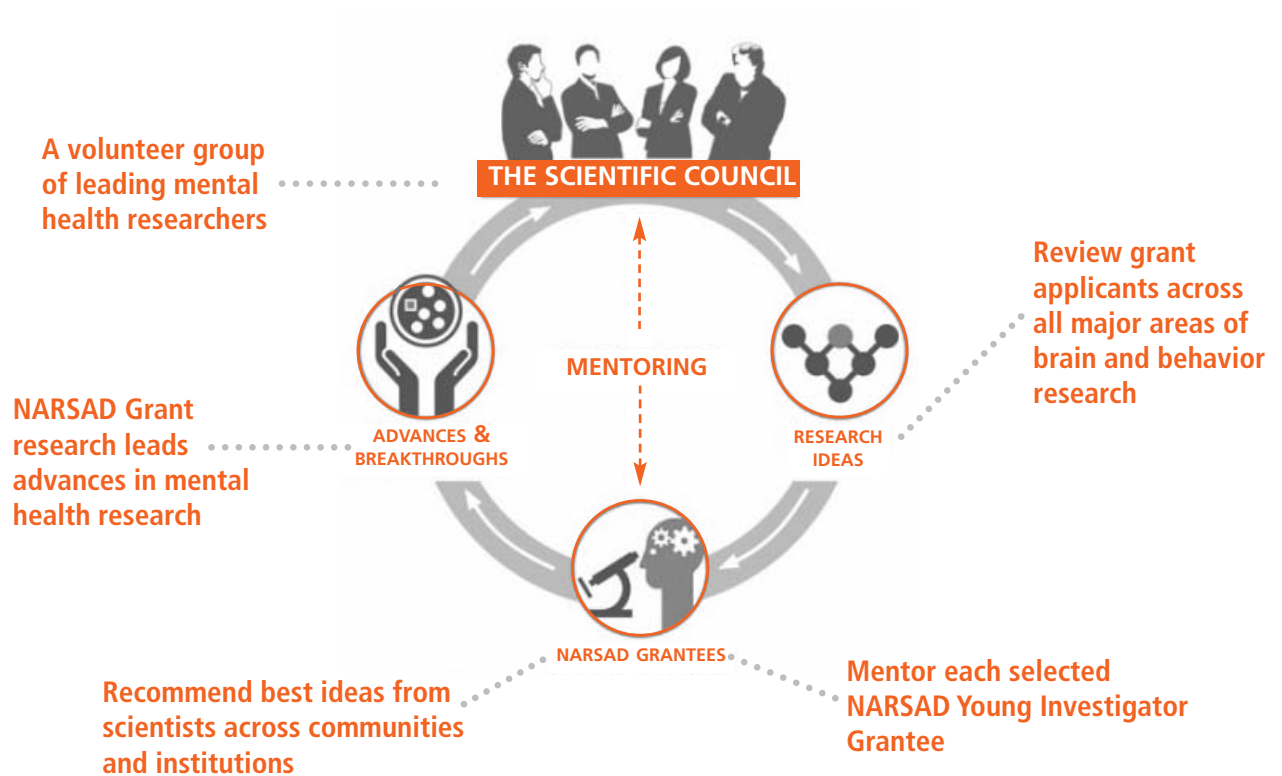
Leadership

2 Nobel Prizewinners

11 Members of the National Academy of Sciences

23 Chairs of psychiatry departments of leading universities & medical schools

4 Former directors of the National Institute of Mental Health



SCIENTIFIC COUNCIL OUR NEWEST MEMBERS

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and Department of Psychiatry
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Carver College of Medicine



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Director, Program in Cellular Molecular Medicine
and Johns Hopkins Schizophrenia Center
Johns Hopkins University



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Brain & Behavior Research Foundation

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Yale University



Newly Elected Scientific Council Member - 2011

Dr. Arnsten's research focuses on the highly evolved prefrontal cortex, elucidating the molecular mechanisms that determine the strength of network connections and cognitive abilities

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University of Washington

Rachel G. Klein, Ph.D.
New York University

John H. Krystal, M.D.
Yale University

James F. Leckman, M.D.
Yale University

Ellen Leibenluft, M.D.
National Institute of Mental Health

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University of New England

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University of Pittsburgh

Jeffrey A. Lieberman, M.D.
Columbia University

Irwin Lucki, Ph.D.
University of Pennsylvania

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Stanford University

Anil K. Malhotra, M.D.
Zucker Hillside Hospital

Husseini K. Manji, M.D., FRCPC
Johnson & Johnson PRD

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Emory University School of Medicine

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The Rockefeller University

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Ronald McKay, Ph.D.
Johns Hopkins University

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Vanderbilt University

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National Institute of Mental Health

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Eli Lilly & Company

Godfrey D. Pearlson, M.D.
Yale University School of Medicine

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University of California, Irvine

Pasko Rakic, M.D., Ph.D.
Yale University

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National Institute of Mental Health

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Kerry J. Ressler, M.D., Ph.D.
Emory University

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George Washington University

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University of North Carolina at Chapel Hill

John L. R. Rubenstein, M.D., Ph.D.
University of California, San Francisco

Elaine Sanders-Bush, Ph.D.
Vanderbilt University

Akira Sawa, M.D., Ph.D.
Johns Hopkins University

Alan F. Schatzberg, M.D.
Stanford University

Nina R. Schooler, Ph.D.
State University of New York, Downstate

Robert Schwarcz, Ph.D.
University of Maryland

Philip Seeman, M.D., Ph.D.
University of Toronto

Solomon H. Snyder, M.D., D.Sc., D.Phil.
Johns Hopkins University

John S. Strauss, M.D.
Yale University

John David Sweatt, Ph.D.
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John A. Talbott, M.D.
University of Maryland School of Medicine

Carol A. Tamminga, M.D.
University of Texas Southwestern Medical Center, Dallas

Laurence H. Tecott, M.D., Ph.D.
University of California, San Francisco

Ming T. Tsuang, M.D., Ph.D., D.Sc.
University of California, San Diego

Leslie G. Ungerleider, Ph.D.
National Institute of Mental Health

Rita J. Valentino, Ph.D.
University of Pennsylvania

Nora D. Volkow, M.D.
National Institute on Drug Abuse

Karen Dineen Wagner, M.D., Ph.D.
University of Texas Medical Branch at Galveston

Daniel R. Weinberger, M.D.
Johns Hopkins University

Jon-Kar Zubieta, M.D., Ph.D.
University of Michigan

Discovery

A Sampling of NARSAD Grants at Work HIGHLIGHTS FROM 2011

Basic Research **New Technologies**
Diagnostic Tools / Early Intervention
Next Generation Therapies

Basic Research

SC =
Scientific Council
Member

DI =
Distinguished
Investigator

II =
Independent
Investigator

YI =
Young
Investigator

RP =
Research
Partnership

Schizophrenia / Bipolar Disorder

> Jonathan Mill, Ph.D., and colleagues demonstrated that potentially reversible epigenetic changes play a key role in mental illness in the first study to systematically investigate genome-wide epigenetic differences in a large number of psychosis discordant twin-pairs.



2008 YI

Anxiety / PTSD

> Michael Fanselow, Ph.D., and Stephanie Bissiere, Ph.D., were part of a team that uncovered a previously unexplored target for anti-anxiety treatments—gap junctions in the brain, which, if blocked with drugs, could prevent fear memories from forming.



2011 DI



2010 YI

OCD

> Stephanie Dulawa, Ph.D., and colleagues isolated a single neurotransmitter receptor in a specific brain region responsible for OCD-like symptoms, offering a new avenue for developing better treatments in a disease where there is only one successful therapy to date.



2007 YI

Autism

> Schahram Akbarian, M.D., Ph.D., and colleagues were the first to map epigenetic changes in neurons from the brains of individuals with autism, providing empirical evidence that epigenetic alterations—changes in gene expression caused by mechanisms other than changes in the underlying DNA sequence—may play an important role in the disease.



SC, 1993 and 2000 YI



Dr. Bissiere received a 2010 NARSAD Young Investigator Grant for her research project entitled "Investigating the Role of Neuronal Gap Junctions in Anxiety Disorders." Early on in 2011, she and a team of researchers at UCLA, including NARSAD Distinguished Investigator Grantee, Michael Fanselow, successfully made a discovery that has major implications for new treatment targets in PTSD and other anxiety disorders.

New Technologies

Depression > **Tarique Perera, M.D.**, furthers studies on Transcranial Magnetic Stimulation (TMS), pioneered by **Mark S. George, M.D.** Dr. George estimates that three people a day are recovering from depression because of TMS.



2004 YI

SC
1996 YI, 1998 II

Schizophrenia > **Guo-li Ming, M.D., Ph.D.**, 2010 II, **Russell L. Margolis, M.D.**, 1994 YI, 1999 and 2003 II, 2007 DI, **Christopher A. Ross, M.D., Ph.D.**, 1990 YI, 1995 and 2004 DI, **Hongjun Song, Ph.D.**, 2008 II, and others used stem-cell technology to reprogram skin stem cells



Dr. Song

with a risk gene for schizophrenia. Such cells have potential to revolutionize drug screening.
2008 II

Diagnostic Tools / Early Intervention

Depression > **Andrea Danese, M.D., Ph.D.**, and colleagues discover that people mistreated in childhood are twice as likely to suffer depression and respond poorly to treatment, leading the way toward diagnostic and early intervention possibilities for those at risk.



2009 YI
RP - Vital Projects Fund Inc.

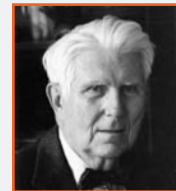
Depression > **Joan L. Luby, M.D.**, and colleagues successfully tested a novel form of psychotherapy called Parent Child Interaction Therapy-Emotion Development (PCIT-ED) to help preschoolers with symptoms of depression function better and learn to regulate their emotions.



1999 YI, 2004 and 2008 II
RP - Oxley Foundation

Next Generation Therapies

Schizophrenia > **Aaron T. Beck, M.D.**, and colleagues demonstrate that cognitive behavioral therapy (CBT) can successfully treat the 'negative' symptoms of schizophrenia, such as emotional flatness, listlessness and isolation.



2006 DI

Depression / Bipolar Disorder > **Carlos A. Zarate, M.D.**, pioneered research on rapid-acting antidepressants, such as ketamine, demonstrating rapid antidepressant effects in treatment-resistant patients with depression and bipolar disorder.



2011 Outstanding Achievement in Mood Disorders Research Prizewinner
1996 YI, 2005 II

NARSAD GRANTS

Building Careers, Changing Lives

Discovery

Jonathan A. Javitch, M.D., Ph.D., Columbia University: Four-time NARSAD Grantee and Scientific Council Member

"My job, when I think about it, is really kind of mind-boggling," reflects Dr. Jonathan Javitch. "I go to work every day and try to think of things that nobody has thought of before. I'm constantly learning, applying new methods, and I have the freedom to adapt my research as I learn." It's all part of an effort, he says, to make discoveries about fundamental biology that will ultimately promote the development of better drugs to treat disorders like schizophrenia, depression, and drug abuse.

Dr. Javitch's career in brain research, although still only at its midpoint, is full of achievements. He is currently Lieber Professor of Experimental Therapeutics in Psychiatry and Professor of Pharmacology as well as Director of the Lieber Center for Schizophrenia Research at Columbia University; he also serves as Chief of the Division of Molecular Therapeutics at the New York State Psychiatric Institute.

"I can say without the least bit of exaggeration that my career in research was launched by NARSAD Grants," he says. "There is no question about it." In fact, Dr. Javitch, who earned M.D. and Ph.D. degrees at Johns Hopkins University after receiving bachelor's and master's degrees from Stanford, is among an elite group of brain and behavioral scientists who have received all three major NARSAD Grant types.

Javitch became interested in the chemistry of the brain as a schoolboy, although he notes that the field of neurochemistry was then in its infancy. "People were just beginning to think about the fact that the brain had a 'chemistry'," he remembers. "But it was emerging that if we really knew what was happening in that space where neurotransmitters and nerve cells interact, we could then

think much more productively about complicated things like circuitry and specific pharmacology."

Javitch's first NARSAD Grant—a Young Investigator Grant—came at the critical moment in 1990 when he was completing his residency in psychiatry at NewYork-Presbyterian Hospital. Although he had a foot in both worlds—clinical psychiatry and research—it was the latter to which he now devoted himself. The NARSAD Grant got his fledgling scientific career off the ground. This is precisely the purpose of the NARSAD Young Investigator Grant, which has performed the same service for more than 3,000 individuals over 25 years.

Javitch had the unusual experience of designing a grant-winning project that he was unable to carry out. Before his grant funding arrived and the work got underway, he landed in the emergency room, the victim of what was diagnosed as a severe allergy to rodents. He had developed an asthmatic reaction, and this made it impossible for him to proceed with his Young Investigator project as proposed. The Foundation (then NARSAD) continued to back Javitch and gave him some time to develop an alternate project.

Javitch's revised project focused on the structure of dopamine receptors. It was already understood that there were two types of dopamine receptors—called D1 and D2. It was also known that drugs which controlled psychosis exerted their effect by occupying the binding pocket of D2 receptors and preventing dopamine molecules from attaching. This knowledge is one of the cornerstones of modern psychopharmacology. But it was not known in mechanistic terms why the blockade of dopamine receptors helped reduce psychotic symptoms.

That knowledge, in other words, was fascinating, but there was so much more to learn, Javitch and others recognized, before it could be put to practical use. Indeed, it was clear that the D1 and D2 receptors were not exactly the same. "We knew the D1 and D2 receptors signaled differently inside the cell, and had different pharmacology. We were aware of drugs that could fairly selectively block or



Building Careers, Changing Lives

Dr. Javitch is a Research Partner with Connie and Steve Lieber for his 2010 Distinguished Investigator Grant

activate each receptor subtype." But knowledge was rapidly advancing; the D2 receptor turned out to be three different receptors, and the D1 receptor proved to be two different receptors. The five are now referred to as D1 through D5.

Javitch and others set out to determine whether any members of this enlarged receptor family might be selectively blocked to produce improved control of psychosis, or to control it with fewer side effects. With his second NARSAD Young Investigator Grant in 1992, Javitch set out to map the D2 receptor in the hope that understanding the precise molecular shape of its drug binding pocket would support the development of new compounds that would interact only with it and not other receptors in the dopamine receptor family.

This work, which continued several years beyond the life of his NARSAD Grants, made possible a "K award" from the National Institutes of Health and not long after formed the basis for the first of many "R-01" awards that Javitch has received from the federal government—the basis for sustaining his scientific research laboratory.

Javitch's third NARSAD Grant, confirming his status as Independent Investigator, enabled him to extend his work in the context of newly obtained knowledge about the complexity of the dopamine receptors. "There were multiple receptors and they talked to one another. We wanted to understand the nature of this cross-talk, through which the receptors modulated one another," Javitch explains.

"It was so much more complex a picture than anyone imagined when the first two dopamine receptors were identified."

Javitch's current NARSAD Grant is a Distinguished Investigator Grant, which has given him the freedom to try something new. He seeks to translate some of the basic knowledge he has gained in past studies to the clinical experience of patients who take antipsychotic medications. Specifically, he is interested in new approaches that might curb the metabolic side-effects of these drugs. It has been thought that weight-gain and other metabolic side effects are related to off-target effects apart from the drugs' blockade of the dopamine D2 receptor. Javitch and his colleagues are testing a bold and high-risk hypothesis that the harm, in part, occurs not in the brain but in cells of the pancreas, which, it has been learned, also contain D2 receptors that regulate insulin secretion. By engineering mice that do not express the D2 receptor selectively in the pancreas Dr. Javitch wants to see if that alone will cause metabolic side effects similar to those seen in patients taking clozapine or olanzapine.

Breeding the mice is slow, but within a year, his team (which handles the mice to which he remains allergic) will have moved another important step down the path of discovery. It is precisely this kind of knowledge—knowledge obtained in basic science investigations that NARSAD Grants have supported—that separates us from the next generation of improved drugs for psychosis and other psychiatric illnesses.

Distinguished Investigator

NARSAD Distinguished Investigator Grants are used to fund a particularly talented, established investigator at the level of full professor or its equivalent, distinguished by a record of outstanding research accomplishments.

Independent Investigator

NARSAD Independent Investigator Grants are awarded to researchers at the associate professor level or equivalent, during the critical period between the initiation of research and the receipt of sustained funding.

Young Investigator

NARSAD Young Investigator Grants are awarded to the most promising brain and behavior scientists to extend their research fellowship training or launch their careers as independent researchers.

NARSAD Grantees

Distinguished Investigator Recipients in 2011

NARSAD Distinguished Investigator Grants are awarded to scientists with a record of extraordinary research accomplishments. Supporting the most innovative ideas in diverse areas of neurobiological research, these research projects are intended to provide new approaches to understanding or treating severe mental illness. When the hypothesis is successfully proven, the NARSAD Grant often results in additional funding from other sources.

BASIC RESEARCH

Mental Illness

Dorret I. Boomsma, Ph.D.

VU Medisch Centrum Vrije Universiteit Amsterdam

Dr. Boomsma is researching the genetic underpinning of mental illness.

By matching data from 60,000 twin-families in The Netherlands' Twin Register—which she established over 20 years ago—to a national database of pathology reports in The Netherlands, she will study whether twin data correctly estimates inheritability of brain and behavior disorders.

Flora M. Vaccarino, M.D.

Yale University

Dr. Vaccarino is investigating the genetic and epigenetic factors that govern abnormalities in key inhibitory neurons in severe brain and behavior disorders. Using recent methods of deriving human stem cells from fibroblasts, she seeks to understand the role the decrease in GABA neurons, which was revealed in her earlier work, may play in schizophrenia and Tourette syndrome. Dr. Vaccarino is a Research Partner with a donor who wishes to remain anonymous for this 2011 NARSAD Distinguished Investigator Grant.

Schizophrenia

William F. Byerley, M.D.

University of California, San Francisco

Dr. Byerley and his team will study the genetic aspects of specific families who have multiple cases of schizophrenia. The families are from an isolated population in Micronesia, about 500 miles east of the Philippines. Their quest is to identify common and rare genetic variants linked to schizophrenia.



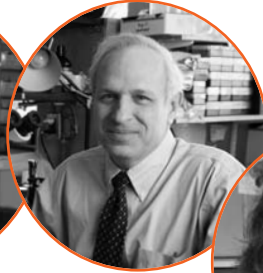
I-r: Drs. Boomsma, Vaccarino and Byerley

2011 Distinguished Investigators

Josh Z. Huang, Ph.D.

Cold Spring Harbor Laboratory

Using a genetically engineered mouse strain, Dr. Huang and colleagues will study types of cells, termed chandelier cells, which are key to inhibitory circuits in the brain's frontal areas, and are present in both mice and humans. His goal is to discover how genetic alterations associated with behavioral symptoms of schizophrenia disturb the development and function of neural circuits.



l-r: Drs. Huang, Cohen, Haber, and Jan

NEW TECHNOLOGIES

Mental Illness

Bruce M. Cohen, M.D., Ph.D.

Harvard University

In collaboration with the Broad Institute of Harvard and MIT, Dr. Cohen is examining disease-related abnormalities in brain cells to understand their links to mood and psychotic disorders. These processes cannot be easily studied in the living brain, therefore Dr. Cohen and his team will use recent technological developments to 'induce' stem cells from fibroblasts of hundreds of patients and control subjects. This work is expected to yield crucial new discoveries.

Suzanne N. Haber, Ph.D.

University of Rochester

Dr. Haber is conducting a complex and intensive study, using animal models, in order to shed light on the developmental process of white matter in prefrontal cortical areas of the brain. While much is known about the importance of neural circuits involving the prefrontal cortex to a variety of severe mental illnesses, little is known about the development of white matter tracts. Highly sophisticated technology will be used, including rendering materials into 3-D images. Dr. Haber is a Research Partner with the Margaret L. Wendt Foundation for this 2011 NARSAD Distinguished Investigator Grant.

Lily Y. Jan, Ph.D.

University of California, San Francisco

In a creative new approach, Dr. Jan will use highly sophisticated technology in animal models to investigate behavioral and gene expression changes induced by drug treatment. Her goal is to study the role mother-infant communication may play in the dysfunctional development of social interaction and communication in major mental illnesses.

NARSAD Grants are among the most competitive in biomedical research because of the great ability and career success of the applicants. The grants are helpful in funding innovative research. Receiving a NARSAD Distinguished Investigator Grant constitutes a great honor for the recipient.

Jack D. Barchas, M.D.

Founding Scientific Council Member
Director of the Distinguished Investigator Grant Review Committee
Brain & Behavior Research Foundation
Chair and Barklie McKee Henry Professor of Psychiatry
Weill Cornell Medical College
Psychiatrist-in-Chief, Weill Cornell Medical Center
NewYork-Presbyterian Hospital and Payne Whitney Clinic

2011 Distinguished Investigators

Massimo Scanziani, Ph.D.

University of California, San Diego

Applying innovative approaches to study the brain circuitry of schizophrenia and other mental illnesses, Dr. Scanziani will employ both chemical and optogenetic manipulations of neuronal activity in animal models to attempt to identify individual, genetically discernable differences in processing sensory information.



l-r: Drs. Scanziani, Fanselow, Pantelis and Hoffman

NEW TECHNOLOGIES

Post-Traumatic Stress Disorder

Michael S. Fanselow, Ph.D.

University of California, Los Angeles

To further his work in unraveling the neuronal mechanisms underlying post-traumatic stress disorder (PTSD), Dr. Fanselow is using cutting-edge neural imaging techniques. He plans to discover the footprint of neuronal circuitry that is activated by PTSD-engendered fear memories which cannot be extinguished, versus those which can adapt to fear responses.

The NARSAD Grant has enabled me to launch a new research direction examining brain mechanisms causing schizophrenia, and will allow us, for the first time, to test the hypothesis—which provides a detailed roadmap of how schizophrenia might develop—directly in the brain using functional MRI (fMRI).

Ralph E. Hoffman, M.D., Yale University

DIAGNOSTIC TOOLS / EARLY INTERVENTION

Psychosis

Christos Pantelis, M.B.B.S., M.D., MRCPsych., FRANZCP

University of Melbourne, Australia

Dr. Pantelis is looking at whether the active gray matter brain changes he and colleagues have identified at the start of illness in pre-psychotic young people are caused by inflammatory processes. He is taking a creative new approach using positron emission tomography (PET) and other forms of brain imaging in individuals at high risk for illness to test this interesting hypothesis.

Schizophrenia

Ralph E. Hoffman, M.D.

Yale University

Dr. Hoffman is studying some of the most perplexing, and least understood, aspects of schizophrenia, such as difficulties with narrative language and delusions. Using fMRI scanning on patients with schizophrenia and normal controls, the research could result in new approaches to diagnosis and treatment.

2011 Distinguished Investigators



l-r: Drs. Martin, Parry, Marder and Sawa

NEXT GENERATION THERAPIES

Mental Illness

Kelsey C. Martin, M.D., Ph.D.

University of California, Los Angeles

An expert in studying some of the most relevant steps in the control mechanisms by which synapses change and how they may be linked to cognitive impairments in some forms of mental illness, Dr. Martin seeks to identify new therapeutic targets by studying the repertoire of synaptically-localized mRNAs and miRNAs to investigate how they change with neuronal activity and how mutations can alter them.

Depression

Barbara L. Parry, M.D.

University of California, San Diego

Dr. Parry is studying sleep and light therapies for major depression in pregnancy and/or during the postpartum period. This serious public health issue impacts the emotional health of mother, child and the family. These novel treatments may improve symptoms of depression without the side effects of pharmacological treatments.

Schizophrenia

Stephen R. Marder, M.D.

University of California, Los Angeles

Dr. Marder will add pharmacological treatment, by administering oxytocin, to the training methods he and colleagues have developed to treat cognitive and social behavioral deficits in schizophrenia. The work may lead to improved treatments resulting in heightened sensitivity to social cues in patients with schizophrenia.

Akira Sawa, M.D., Ph.D.

Johns Hopkins University

Using extensive sample collections and methods developed in his program, combined with a new technology, Dr. Sawa will attempt to compare key aspects of neurons from individuals with schizophrenia and those from control individuals. The proposed work is expected to point toward new directions for treatment.

I am fortunate to have received research support from NARSAD throughout my career. My laboratory uses basic molecular and cell biological approaches to understand how experience changes the circuitry of the brain, and NARSAD-Grant funding has allowed us to more directly consider our studies in the context of human mental illness.

Kelsey C. Martin, M.D., Ph.D., UCLA

2011 KLERMAN / FREEDMAN PRIZES /

VISIONARY PHILANTHROPIST AWARD

Discovery

The Klerman / Freedman Prizes pay tribute to Drs. Gerald L. Klerman and Daniel X. Freedman, whose legacies as researchers, teachers, physicians and administrators indelibly influenced neuropsychiatry. Their outstanding contributions continue to inspire scientists who knew them as well as those just entering the field.

On Friday, July 29, 2011, the Brain & Behavior Research Foundation honored six NARSAD Young Investigator Grantees at the Klerman / Freedman Prize presentation ceremony held in New York City at Le Parker Meridien Hotel. These young researchers were chosen by a committee of the Brain & Behavior Research Foundation Scientific Council for their exceptional NARSAD Grant projects in terms of insight and potential new approaches to the treatment of mental illness. Each investigator has demonstrated exceptional promise in the pursuit of deeper understanding of the human brain to ultimately conquer mental illness.

Exceptional Clinical Research by a NARSAD Young Investigator Grantee

2011 KLERMAN PRIZEWINNER

for 2007 NARSAD Young Investigator Grant
Research Project:

**Metabolic and Hormonal Abnormalities
in Children Treated with Risperidone:
A Two-Year Follow-Up Study**



Chadi Calarge, M.D.

Associate Professor, Department of Psychiatry
University of Iowa

Dr. Calarge has received two NARSAD Young Investigator Grants from the Brain & Behavior Research Foundation. The first, awarded in 2005, funded a cross-sectional study to evaluate the long-term skeletal effects of risperidone, the antipsychotic most commonly prescribed for children and adolescents. The 2007 grant supported a follow-up assessment of the participants in the original research sample. These studies have led to the development of an extensive dataset that includes a comprehensive review of the participants' developmental and treatment history. This information now opens the way for Dr. Calarge and his colleagues to explore questions related to the safety of psychotropics, and to look for safety-enhancing interventions.



The contribution of the Brain & Behavior Research Foundation funding support to my career and research cannot be overstated. The work has resulted in more than two dozen presentations, posters and publications with several additional ones in preparation. The findings generated four grants from the National Institute of Health with a value of approximately \$3.5 million in direct costs with an additional \$1.5 million in indirect costs. Thank you to the Brain & Behavior Research Foundation.

– Chadi Calarge, M.D.

Klerman / Freedman Prizes

Exceptional Basic Research
by a NARSAD Young Investigator Grantee

2011 FREEDMAN PRIZEWINNER

for 2007 NARSAD Young Investigator Grant
Research Project:

**Serotonin Modulates Axon Guidance Mechanisms
During Brain Development**



Alexandre Bonnin, Ph.D.

Assistant Professor of Research
University of Southern California

The recipient of two NARSAD Young Investigator Grants awarded by the Brain & Behavior Research Foundation, Dr. Bonnin's initial efforts uncovered a new role for the neurotransmitter serotonin in the fetal brain. This in turn led to a surprising discovery that for the first time establishes a direct link between the maternal-fetal interface and fetal brain development. This finding points to serotonergic modulation of axon guidance mechanisms as important in the fine-tuning of fetal brain wiring.



Thanks to the data generated using my 2007 NARSAD Young Investigator Grant given by the Brain & Behavior Research Foundation, I recently obtained a grant from the National Institute of Child Health and Human Development. This enabled me to develop an *ex vivo* placental perfusion system and discover the placental source of serotonin in utero. These results were recently published in the journal *Nature*.

— Alexandre Bonnin, Ph.D.

Discovery

Klerman / Freedman Prizes

2011 KLERMAN PRIZE HONORABLE MENTIONS

Brian D'Onofrio, Ph.D.

Associate Professor of Clinical Psychology
Department of Psychological and Brain Sciences
Indiana University-Bloomington

**for 2007 NARSAD Young Investigator Grant
Research Project:**

**Quasi-Experimental Studies of the Inter-
generational Transmission of Major Depression**



Jennifer S. Silk, Ph.D.

Associate Professor, Department of Psychiatry
University of Pittsburgh School of Medicine

**for 2007 NARSAD Young Investigator Grant
Research Project:**

**Neural and Social Mechanisms of Altered
Emotion Regulation Among Adolescents
at High Risk for Depression**



2011 FREEDMAN PRIZE HONORABLE MENTIONS

Alberto Bacci, Ph.D.

Senior Group Leader
Brain and Spine Institute, Paris, France

**for 2007 NARSAD Young Investigator Grant
Research Project:**

**Parvalbumin Modulation of Inhibitory
Synaptic Transmission and Network
Oscillations in the Neocortex**



Andrew A. Pieper, M.D., Ph.D.

Assistant Professor of Psychiatry
and Biochemistry
University of Texas Southwestern
Medical Center at Dallas

**for 2007 NARSAD Young Investigator Grant
Research Project:**

**Investigation of the Role of the Brain-Specific
Transcription Factor Neuronal PAS Domain
Protein 3 (NPAS3) in Hippocampal Neurogenesis**



2011 VISIONARY PHILANTHROPIST AWARDEE

George B. Handran, Esq., representing the
Trustees of the Sidney R. Baer, Jr.
Foundation and U.S. Bank

At the 2011 Klerman /
Freedman Prize pres-
entation ceremony,
the Trustees of the
Sidney R. Baer, Jr.
Foundation, George B.
Handran, Esq. and U.S.
Bank were recognized
by the Brain & Behav-
ior Research Founda-
tion with the Visionary
Philanthropist Award.



In 2002, when Sidney
R. Baer, Jr., died, the Trustees of his estate were
faced with the prospect of how to best utilize the
funds he left for the benefit of mental health. He
wanted to help others who suffer from mental
illness like he did during his lifetime. Some of his
ideas were discussed while he was alive, and one
that interested him was funding medical research.

The Trustees were directed to the Brain & Behavior
Research Foundation, and a valuable partnership
was formed that has provided a powerful opportu-
nity to learn about medical research and fund
incredibly exciting work.

The Trustees have come to realize that the most
difficult task is to decide which and how many of
the Brain & Behavior Research Foundation NARSAD
Grantees to support based on available funding.

To have the benefit of the Brain & Behavior
Research Foundation Scientific Council vet
the best applications for NARSAD Grants,
and then to have complete discretion in
selecting scientists to fund is a unique and
phenomenal opportunity to support the
vision of the Sidney R. Baer, Jr. Foundation.

George B. Handran, Esq.

2011 OUTSTANDING ACHIEVEMENT PRIZES

On Wednesday, October 26, 2011, the Brain & Behavior Research Foundation celebrated its 24th Annual National Awards Dinner at The Pierre Hotel in New York City. The evening's honorees were six world-renowned scientists and two extraordinarily talented young investigators recognized for their outstanding contributions to research on schizophrenia, affective disorders, child and adolescent psychiatry and cognitive neuroscience.

LIEBER PRIZE Outstanding Achievement in Schizophrenia Research



Carol A. Tamminga, M.D.

Dr. Tamminga seeks to understand how schizophrenia and related disorders arise and to hasten the translation of laboratory discoveries into innovations in clinical care. A major focus of her laboratory is the investigation of the cognitive deficits seen in schizophrenia and implicated in the occupational and social deficits associated with the disorder, and for which treatment is still largely nonexistent. Dr. Tamminga is chair and professor of the department of psychiatry, vice chair for research and chief of translational neuroscience research in schizophrenia at the University of Texas Southwestern Medical Center at Dallas. The author of over 300 scientific papers, she is currently deputy editor of the *American Journal of Psychiatry*.



Joel E. Kleinman, M.D., Ph.D.

Over the last 35 years, Dr. Kleinman has pioneered investigations into the molecular biology of brain development and disorders, particularly schizophrenia, amassing one of the most important collections of postmortem human brains for such studies. A neurologist, psychiatrist and pharmacologist, he has contributed to fundamental discoveries concerning the neuropathology of schizophrenia and its genetic basis and how genetic variation impacts brain structure and function. Dr. Kleinman has served for a quarter-century as chief of the Section on Neuropathology and deputy chief of the Clinical Brain Disorders Branch in the Genes, Cognition and Psychosis Program of the National Institute of Mental Health Intramural Research Program.

BIPOLAR MOOD DISORDERS PRIZE **Outstanding Achievement in Mood Disorders Research**



David J. Miklowitz, Ph.D.

Dr. Miklowitz's research focuses on family factors related to the course of major, recurrent psychiatric disorders, notably bipolar disorder and schizophrenia. His studies have been key to helping establish the effectiveness of using psychosocial interventions as adjuncts to medication in the treatment of childhood and adult-onset bipolar disorder. Dr. Miklowitz is professor of psychiatry in the Division of Child and Adolescent Psychiatry at the University of California, Los Angeles Semel Institute for Neuroscience and Human Behavior. He has received two NARSAD Grants, including a Young Investigator Grant in 1987 and a Distinguished Investigator Grant in 2001.



Carlos A. Zarate, M.D.

Dr. Zarate is an internationally recognized authority on the pathophysiology of mood disorders. His research focuses on the development of novel therapeutics for treatment-resistant mood disorders. His research on the rapid antidepressant effects of the glutamatergic modulator ketamine has shown potential for developing the next generation of faster-acting and more effective antidepressants. He is chief of the Experimental Therapeutics and Pathophysiology Branch and Section on Neurobiology and Treatment of Mood Disorders of the Intramural Research Program of the National Institute of Mental Health.

RUANE PRIZE **Outstanding Achievement in Child & Adolescent Psychiatric Research**



Daniel S. Pine, M.D.

Dr. Pine has done groundbreaking work in understanding biological and pharmacological aspects of psychiatric disorders in children and adolescents that is helping to implement new treatments, both pharmacological and behavioral. He is currently examining the degree to which mood and anxiety disorders in children and adolescents are associated with underlying abnormalities in the amygdala, a brain area involved in emotion and memory, and the prefrontal cortex, critical to higher cognitive functions, and other brain regions that modulate activity in those two structures. Dr. Pine is the chief of the Section on Development and Affective Neuroscience in the Mood and Anxiety Disorders Program of the National Institute of Mental Health Intramural Research Program.

2011 OUTSTANDING ACHIEVEMENT PRIZES

GOLDMAN-RAKIC PRIZE Outstanding Achievement in Cognitive Neuroscience



Michael E. Goldberg, M.D.

Dr. Goldberg's studies have centered on the physiological basis of two important cognitive problems: how the brain organizes visual attention and the eye movements that are the overt manifestation of attention; and how the brain creates a unitary concept of the visual world for perception and action despite a constantly moving eye. He established for the first time that visual responses, at the level of the single neuron, could be modulated by non-visual factors such as attention. His discovery opened a whole field of physiological exploration of cognitive processes. Dr. Goldberg is the David Mahoney Professor of Brain and Behavior in the departments of neuroscience, neurology, psychiatry and ophthalmology at Columbia University College of Physicians and Surgeons and the New York State Psychiatric Institute.

SIDNEY R. BAER, JR. PRIZE Innovative and Promising Schizophrenia Research



Elena I. Ivleva, M.D., Ph.D.

The goals of Dr. Ivleva's research are to use spontaneous behaviors of the brain (phenotypes) to identify overlapping and distinguishing characteristics of patients with schizophrenia and psychotic bipolar disorder, also associating these clinical intermediate phenotypes with genes. Her brain imaging data will touch the debate on psychiatric diagnoses, as well as contribute to genetic studies. She is a Research Partner with Ken Harrison for her 2010 NARSAD Young Investigator Grant and is currently completing the final year of a research residency in psychiatry at the University of Texas Southwestern Medical Center at Dallas.



Amanda J. Law, Ph.D.

Dr Law's research is both translational and innovative, bridging the gap between basic neuroscience, clinical genetics and clinical pharmacology. Her research focuses on understanding the molecular and cellular mechanisms of genetic susceptibility to schizophrenia. Over the years, her groundbreaking work has provided insight into the role of a key neurodevelopmental pathway in schizophrenia. Dr. Law is a senior research fellow at the National Institute of Mental Health and was a recipient of a 2006 NARSAD Young Investigator Grant.

2011 Annual National Awards Dinner



Top row, l-r: Foundation Board Member Suzanne Golden and Sherry Warren, friend of the Brain & Behavior Research Foundation; Ellen and Howard Schusterman, long-time supporters of the Brain & Behavior Research Foundation; Foundation Board Member Milton Maltz and Tamar Maltz; Second row l-r: Constance Lieber, President Emerita, and Stephen Lieber, Foundation Chairman of the Board; Long-time supporters of the Foundation Jan and Stefan Abrams; Friend and supporter of the Foundation Luisa Francouer with stepdaughter Lisa Goodrich; Bottom row, l-r: George B. Handran, Esq., representative of the Sidney R. Baer, Jr. Foundation and Brain & Behavior Research Foundation Board Member with Baer Prizewinner Dr. Amanda Law, Dr. Herbert Pardes, President of the Brain & Behavior Research Foundation Scientific Council, and Baer Prizewinner Dr. Elena Ivleva; Drs. Joel Kleinman, Daniel Pine and Carlos Zarate





BRAIN & BEHAVIOR
RESEARCH FOUNDATION
Awarding **NARSAD** Grants

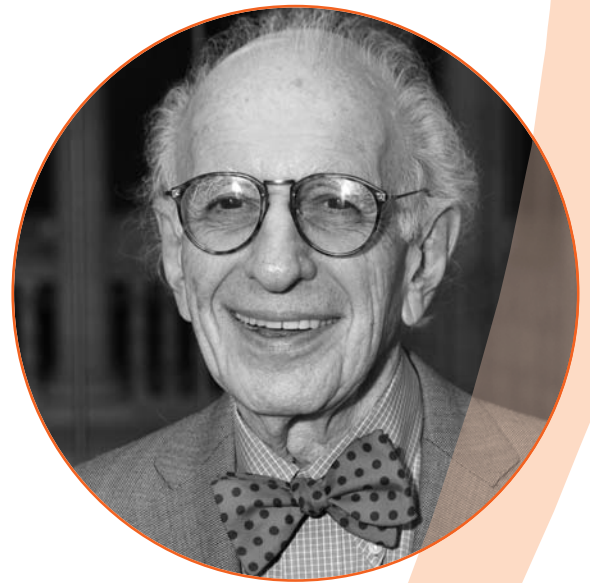
NARSAD GRANTS

25 Years of Empowering Research for Productive Lives

The Brain & Behavior Research Foundation, through its NARSAD Grants, has made an extraordinary contribution, not only in providing funds for psychiatric research but in helping to structure the field.

Eric R. Kandel, M.D., Nobel Prize Winner

Columbia University University Professor; Fred Kavli Professor and Director, Kavli Institute for Brain Science; Scientific Council Member



The Brain & Behavior Research Foundation has provided more than 4,000 grants worth \$275,947,302 to researchers studying brain and behavior disorders worldwide

bbrfoundation.org

SUPPORT OUR CAMPAIGN for **Productive Lives**



Our Campaign Objective:

Accelerate the breakthroughs with \$200 million in new support over five years

What will \$200 million achieve?

\$120 million additional funding for Young Investigators

- Increase grant amount from \$60,000 to \$90,000 over two years
- Grants awarded to the most promising young scientists

\$50 million additional funding for Independent Investigators

- Grants awarded to researchers during the critical period between initiation of research and receipt of sustained funding

\$30 million additional funding for Distinguished Investigators

- Grants used to fund particularly talented, established investigators

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to find out more

Ways You Can Give

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- **TeamUp!**



Why We Support the Foundation

We have been supporters of NARSAD and now the Brain & Behavior Research Foundation since 1995. Having a son suffering from schizophrenia has been a difficult journey for our family, but seeing the remarkable research by the Foundation investigators has provided the hope to keep on fighting. There is no other organization on the planet better poised to make real breakthroughs in brain and behavior science – and bring the joy of living back to our dear son, Daniel.

–Milton and Tamar Maltz

Recovery

2011 Productive Lives Award Fountain House of New York City

At the National Awards Dinner on October 26, 2011, the Brain & Behavior Research Foundation presented its Third Annual Productive Lives Award to Fountain House in New York City. The award was accepted by its president, Kenneth J. Dudek. Kenn leads an organization that for 63 years has been helping people with mental illness reconnect with the world. A working community in the heart of New York City, Fountain House is a place where members can be active and productive, sharing responsibility with the professional staff for all aspects of running the facility, whether it's cooking, growing hydroponic lettuce or answering the phone. It's a place where social ties are established and there are resources for helping find work or school opportunities as well as referrals for medical and other services.



Once you get medications you need to do something else with your life. People need to pay as much attention to the environmental side as the biological side of the illness.

Research Gives People **Hope**

Multiple family illnesses inspire a couple's life-long commitment to the mental health cause

No one knows better than the Garatt family how far research in mental illness has come—and how far it still has to go. Thirty-three years ago, when son Sean was diagnosed with schizophrenia, Marcia was told that she was the cause. The “bad mothering” theory eventually collapsed under an avalanche of research pointing to schizophrenia as a biological illness, opening the door for more treatment options.

By the age of 14, the once cheerful, responsible Sean had grown angry and argumentative, hiding away in his room. The Garatts could later recall some startling earlier clues to his—and their—impending reality. They remember a day when 12-year-old Sean, browsing in the Encyclopedia Britannica, looked up and said, point blank, “I have schizophrenia.” More painfully unforgettable, at the age of five he told them that he felt “like I have a tangled Slinky toy in my head.”

Sean was 17 years old at the time of his first psychotic break. He remained seriously ill, his life a shambles, until the age of 31, when he was given clozapine, an antipsychotic drug developed for treatment-resistant schizophrenia in the late 1980s under the leadership of Brain & Behavior Research Foundation Scientific Council Member Herbert Meltzer, M.D. With medication Sean got better; not totally well, but mostly free of mind-imprisoning psychosis and able to live an ordered, if limited, life. “Now, he knows what day it is,” Marcia says.

Seven years ago, Marcia and Paul moved to Paducah, Kentucky, to be near their younger son and his family. Sean moved with them, but lives on his own. Each morning he calls his parents to reassure them he has taken his meds. He takes halperidol (Haldol), an older, so-called typical antipsychotic, in combination with clozapine.



Marcia, Sean and Paul Garatt

Among the things clinicians and researchers have learned is the importance of tailoring medications to the individual patient. One size does not fit all. Once, when a new doctor took Sean off halperidol, he crashed.

Atypical antipsychotics like clozapine can have some serious side effects. A common side effect is metabolic syndrome, marked by weight gain, high blood pressure and the risk of diabetes and cardiovascular illness. Sean has put on weight, so every day he and Marcia go to a fitness center. He also attends diabetes prevention classes.

“We’re most appreciative of the Brain & Behavior Research Foundation,” Marcia says. “When I read what their scientists are doing, I’m just amazed. As I try to keep up with things that are going on in research, I get the feeling that they are way ahead of the curve.” Says Paul: “Research gives people hope.”

Even before their son's diagnosis, Marcia and Paul Garatt were no strangers to mental illness. Paul has been battling anxiety and depression most of his life, including a close brush with suicide.

I Thought Maybe This Was Normal

A family's struggle with bipolar disorder highlights the importance of diagnosis and early intervention

Determination was needed from the start even to put a name to Owen Whalen's troubles. As recently as the period when Owen was showing symptoms, the diagnosis of childhood bipolar disorder was being disputed. He began feeling that "something wasn't right" when he was around seven. "I went through a lot of depression," Owen says. "It was very painful, but I guess because I was so young I thought maybe this was normal." He wound up in a hospital psychiatric ward when he was 11 years old. Owen has bipolar disorder. He's been in remission for a few years now, but getting there has been a tough slog, and considering the grim suicide statistics for people with his illness, the outcome could have been very different.

Bipolar disorder, characterized by cycles of depression and mania, typically has a first episode of depression. The disorder has frequently been treated with antidepressant medication however, without mood stabilizers, antidepressants can catapult a bipolar patient into full-blown mania. In the hospital Owen was given two antidepressants and sent home with a third. "He came home on a Tuesday," Owen's mom Alison recalls, "and by Saturday he'd had 11 cycles. We were frantic."

A target for school bullies, by fifth grade the bullying had escalated to the point where Owen was running away from school, and his behavior at home was becoming alarming. He cut off all his hair and started destroying his favorite things. He took his beautiful artwork, pieces he'd been most proud of, and cut them up. For Alison it was a call to arms—even before the suicide threat that sent



Owen with his mom Alison and Owen's high school graduation photo



Owen to the hospital. His suicidal ideation lasted a long time, his depressive cycles were severe, and he had psychotic symptoms.

After Owen was released from the hospital the search for a psychiatrist began. Alison wanted someone who would be as passionate as she was about helping her child get better. Finding that person was not easy. The correct diagnosis finally came from child psychiatrist and researcher, Barbara Gracious, a 2000 NARSAD Young Investigator at the University of Rochester who specializes in bipolar disorder. After careful examination, she agreed that Owen had bipolar disorder. "I was relieved," Alison says, "no more antidepressants."

"It was around two years in," Alison recalls, "when the doctors started using the word 'stable'." When Owen was 14, they were talking about remission," and Alison began to see "the boy I knew. I had my child back."

Understanding the urgent need for more research, Alison has become a supporter of the Brain & Behavior Research Foundation.

The unwavering determination of his mother to understand what was happening to her son and to find the resources to help him leads Owen to say "I doubt I'd be here today without her."

One Young Man's Rocky Road to Recovery

Overcoming the challenge of living with symptoms of schizophrenia and bipolar disorder – a mix seen more often in men

Stephen Maguire and his family have been traveling an up-and-down road for a long time. Stephen started to get into fights at school and lash out at kids who made fun of him. "I can't tell you how many times we'd get admonishing letters from his schools," his mother Betty says. Thinking Stephen might have attention-deficit hyperactivity disorder, they tried Ritalin to no avail.

When Stephen became seriously depressed, he was prescribed Paxil, which made him irrationally angry. Then, with Prozac, Betty says, "he went totally manic," which often happens when people with bipolar disorder are given antidepressants without mood stabilizers. After a brief fling with the up-side of mania (feeling euphoric and omnipotent) Stephen crashed into psychosis and was taken to the local hospital where he yanked a faucet out of the wall. As his psychotic episodes waxed and waned, Stephen went from treatment to treatment.

Then came the day his father Jim walked into the kitchen and found Stephen holding a knife to his belly. "At that point, frantic, we started calling everyone we knew for advice, and one smart person told us to take him to the Menninger Clinic." Betty remembers that on the plane trip to Menninger, Stephen, fearing he might become uncontrollable, had his parents rig ropes through his sleeves, so that if the ropes were pulled, his jacket could serve as an improvised straitjacket.

Last Spring, Stephen found himself back in the Menninger Clinic, where 16 years earlier, at the age of 16, he had been diagnosed with schizoaffective disorder. One of the problems with schizoaffective disorder is difficulty—leading to delay—in diagnosis, as happened to Stephen. His condition was further complicated by obsessive-compulsive disorder and severe anxiety.



Stephen playing football in high school

Co-morbidity in mental illness (more than one illness at the same time) is more common than generally recognized. NARSAD Grantee Keming Gao, M.D., Ph.D., has found it to be the rule rather than the exception, worsening symptoms and complicating diagnosis and treatment.

Stephen has been working with a specialist in Chicago with the hopes that new medication and treatment will work and keep the psychosis at bay. In addition to taking his medications Stephen works with a psychologist who uses cognitive behavioral therapy (CBT), a talk-therapy treatment through which people are guided to identify and correct entrenched misperceptions. "What CBT does," Stephen says, "is attack the fears that grind us down."

Now a mathematics Ph.D. candidate, Stephen is keenly aware that the love and understanding he could always count on from his family is not available to many with mental illness. He says, "When we view the mentally ill as 'other', we're not realizing it could be any one of us."

The Maguire family united in their support for the Brain & Behavior Research Foundation. Partly to "better understand Stephen's illness," says Jim, and because "research just seemed the logical way to achieve advances in the treatment of mental illness. As time goes by, I'm more convinced of it than ever."

Community

23rd Annual New York City Mental Health Research Symposium

October 26, 2011, Bohemian National Hall in New York City

ORGANIZED AND MODERATED BY



Robert M.A. Hirschfeld

Titus H. Harris Chair
Harry K. Davis, M.D. Professor
Department of Psychiatry and Behavioral Sciences
University of Texas Medical Branch at Galveston

COMMENTARY PROVIDED BY



Anthony A. Grace, Ph.D.

Professor of Neuroscience,
Psychiatry and Psychology
University of Pittsburgh



AND

Karen Dineen Wagner, M.D., Ph.D.

Marie B. Gale Centennial Professor and Vice Chair
Director, Division of Child and Adolescent Psychiatry
Department of Psychiatry
University of Texas Medical Branch at Galveston



The 2011 Brain & Behavior Research Foundation Outstanding Achievement Prizewinners I-r: Amanda J. Law, M.Sc., Ph.D. (Sidney R. Baer, Jr. Prizewinner), David J. Miklowitz, Ph.D., Carlos A. Zarate, Jr., M.D. (Bipolar Mood Disorders Prizewinners) Joel E. Kleinman, M.D., Ph.D. (Lieber Prizewinner), Michael E. Goldberg, M.D. (Goldman-Rakic Prizewinner), Daniel S. Pine, M.D. (Ruane Prizewinner), Carol A. Tamminga, M.D. (Lieber Prizewinner), Elena I. Ivleva, M.D., Ph.D. (Sidney R. Baer, Jr. Prizewinner)

RESEARCH **BREAKTHROUGHS** by the 2011 Outstanding Achievement Prizewinners

pages 20 through 22

Pediatric Anxiety: A Neuroscience-Based Approach to Understanding and Treatment

Daniel S. Pine, M.D.

National Institute of Mental Health

As an active investigator in pediatric psychopharmacology and other therapies, Dr. Pine focused on currently available treatments known to be effective; for example, to learn the ways in which selective serotonin reuptake inhibitors (SSRIs) and cognitive behavioral therapies affect the immature brain. This research uses understanding of brain-behavior associations to develop novel means for helping anxious children.

Psychosis as a Learning and Memory Disorder

Carol A. Tamminga, M.D.

University of Texas Southwestern Medical Center at Dallas

The schizophrenia psychosis model Dr. Tamminga described in her presentation proposes a reduced excitatory transmission into and out of a part of the hippocampus called the dentate gyrus, which results in a compromise of functions related to normal learning and memory.

The Molecular Biology of Human Brain Development and Risk for Schizophrenia

Joel E. Kleinman, M.D., Ph.D.

National Institute of Mental Health

In his recent studies, as he explained at the symposium, Dr. Kleinman has been focusing on how genetic variation is associated with alternative transcripts critical for human brain development and schizophrenia risk expressed in the fetal prefrontal cortex, the site of higher thought processes.

Schizophrenia: From Genes to Novel Therapeutics

Amanda Jayne Law, M.Sc., Ph.D.

National Institute of Mental Health

Dr. Law explains that neuregulin 1 (NRG1) and ErbB4 are critical neurodevelopmental genes implicated in schizophrenia and how genetic variation in these genes alters brain development and function is still unknown. Her laboratory's research points to altered signaling inputs from a key regulator of cellular growth, the PI3K/AKT pathway, as being relevant to schizophrenia and to genetic variation in ErbB4 that is potentially restricting the efficiency of NRG1's effects on brain development and function. Her studies have shown that pharmacological inhibition of a key protein in the PI3K/AKT pathway reverses schizophrenia-related behaviors in rodents.

Cognition and Visual Attention: A New Discovery

Michael E. Goldberg, M.D.

Columbia University

Dr. Goldberg discussed his research which has increased understanding of the normal physiological processes that go awry when brain damage affects cognitive functions such as attention, spatial perception and the generation of eye movements. His work established for the first time that visual responses, at the level of the single neuron, could be modulated by nonvisual factors such as attention. This observation opened a whole field of physiological exploration of cognitive processes.

Psychosocial Intervention in the Management of Bipolar Disorder

David J. Miklowitz, Ph.D.

University of California, Los Angeles

In his presentation, Dr. Miklowitz surveyed major methods of psychosocial intervention and their evidence base, with an emphasis on his work using a method called family-focused treatment (FFT). He discussed the application of FFT to adults and adolescents with bipolar disorder in controlled clinical trials. A new multisite trial is examining the role of family intervention in delaying or preventing the onset of bipolar disorder in high-risk children.

Psychosis in Schizophrenia and Bipolar Disorder: Clinical Lore vs. Biological Markers

Elena I. Ivleva, M.D., Ph.D.

University of Texas Southwestern Medical Center at Dallas

Dr. Ivleva discussed the dichotomy of schizophrenia and bipolar disorder diagnoses, with the focus on psychosis as an overlapping clinical dimension. In her research she has identified both similar and distinguishing characteristics of schizophrenia and psychotic bipolar disorder brain structure and function. She is a Research Partner with Ken Harrison for her 2010 NARSAD Young Investigator Grant.

Antidepressant Response in Hours Instead of Weeks

Carlos A. Zarate, M.D.

National Institute of Mental Health

Dr. Zarate discussed his work of understanding the role of glutamatergic modulators in the mechanism of action of antidepressants. In the lab, he and colleagues have demonstrated that the compound ketamine, originally developed as an anesthetic, had long-lasting antidepressant effects that began minutes after its administration as opposed to six to eight weeks of treatment with standard antidepressants before effects are felt. Further studies showed that ketamine worked in patients with treatment-resistant bipolar depression and rapidly decreased suicidal ideation in those patients.

RESEARCH INSIGHTS by 2010 NARSAD Young Investigator Grantees

Schizophrenia, Dendritic Spine Dynamics and Kalirin

Bruce E. Herring, Ph.D.

University of California, San Francisco

Dr. Herring is a recipient of a 2010 NARSAD Young Investigator Grant for his research on kalirin's (a protein) role in the regulation of the glutamate neurotransmission system.



New Nanotechnologies for Diagnosis and Treatment of Schizophrenia

Gordana Vitaliano, M.D.

Harvard Medical School

Dr. Vitaliano received a 2010 NARSAD Young Investigator Grant for her research project on new nanoprobe for noninvasive magnetic resonance imaging of neuroinflammation in schizophrenia.



'Taking Strides Against Mental Illness' Lecture

Using Infant Brain Activity to Better Understand Bipolar Disorder

Katrina C. Johnson, Ph.D.

Emory University School of Medicine



A 2010 NARSAD Young Investigator Grant was awarded to Dr. Johnson for her research to study newborns at risk for bipolar disorder using functional MRI to identify neurodevelopmental factors that may increase the risk of mood disorders.

What Happens in the Brains of People at Ultrahigh Risk for Schizophrenia

Romina Mizrahi, M.D., Ph.D.

University of Toronto



Dr. Mizrahi received a 2010 NARSAD Young Investigator Grant to pursue her work using PET to test her hypothesis that neuroinflammation in the brain is associated with high risk for developing schizophrenia.

Neural Mechanisms of Methylphenidate Treatment of Children

Leslie A. Hulvershorn, M.D., M.Sc.

Indiana University School of Medicine

Dr. Hulvershorn's research project on neural mechanisms of methylphenidate (Ritalin) treatment of emotion regulation in youth with severe mood dysregulation earned her a 2010 NARSAD Young Investigator Grant.



Gloria Neidorf Memorial Lecture

Microbes, Milk & Immune Dysfunction in Schizophrenia, Bipolar & Recent-Onset Psychosis

Emily G. Severance, Ph.D.

Johns Hopkins University



Dr. Severance's 2010 NARSAD Young Investigator Grant focuses on a major gateway of the immune system, the gastrointestinal mucosa, where barrier defects and immune activation may cause pathologies that affect central nervous system dysfunction. She is a Research Partner with the Scott-Gentle Foundation for her 2010 NARSAD Young Investigator Grant.



Meet the Scientist: Virtual Q&A Webinars in 2011

Monday, May 23, 2011

How Do Genes Cause Mental Illness?

Daniel R. Weinberger, M.D.

National Institute of Mental Health

Wednesday, September 14, 2011

Lessons Learned from Experimental Psychopharmacology

John H. Krystal, M.D.

Yale University

Tuesday, June 21, 2011

**Treatments for Schizophrenia:
Current Limitations and Future Strategies**

Jeffrey A. Lieberman, M.D.

Columbia University

Wednesday, October 5, 2011

Rapid-Acting Antidepressant Strategies

William E. Bunney, M.D.

University of California, Irvine

Wednesday, July 13, 2011

Development and Pharmacological Treatment of Schizophrenia

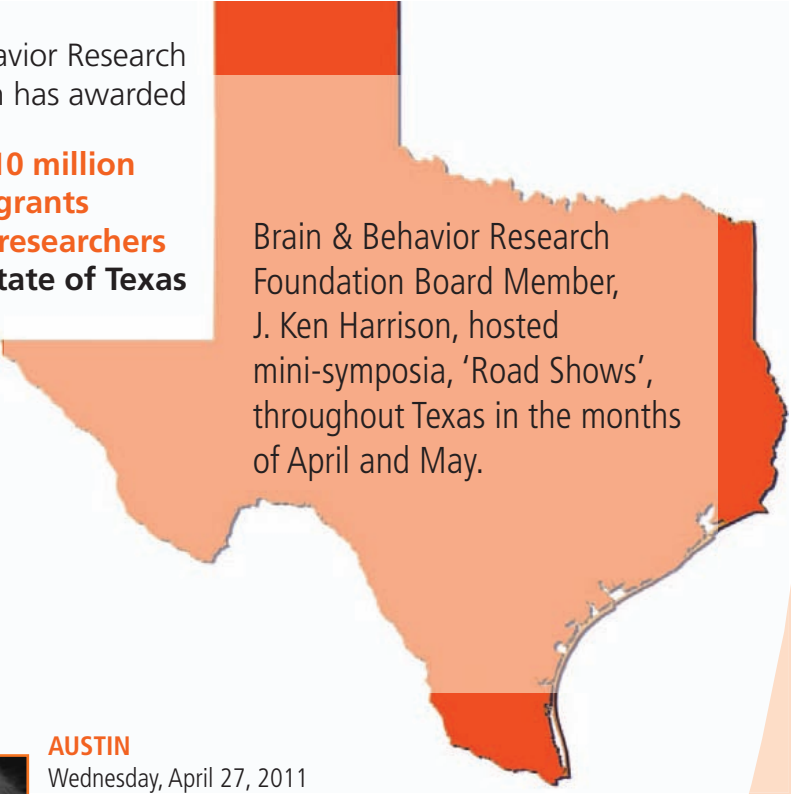
Joseph T. Coyle, M.D.

Harvard University

All presenters are active members of the Brain & Behavior Research Foundation Scientific Council.

Since 1987, the Brain & Behavior Research Foundation has awarded

- **over \$10 million**
- **in 153 grants**
- **to 122 researchers in the state of Texas**



Brain & Behavior Research Foundation Board Member, J. Ken Harrison, hosted mini-symposia, 'Road Shows', throughout Texas in the months of April and May.

HOUSTON

Tuesday, April 26, 2011

Robert M.A. Hirschfeld, M.D.*

University of Texas Medical Branch at Galveston



AUSTIN

Wednesday, April 27, 2011

Robert M.A. Hirschfeld, M.D.*

University of Texas Medical Branch at Galveston and

Karen Dineen Wagner, M.D., Ph.D.*

University of Texas Medical Branch at Galveston



SAN ANTONIO

Thursday, April 28, 2011

Alan Frazer, Ph.D.*

University of Texas Health Science Center at San Antonio and

Consuelo Walss-Bass, Ph.D.

University of Texas Health Science Center at San Antonio



DALLAS

Thursday, May 19, 2011

Carol A. Tamminga, M.D.*

University of Texas Southwestern Medical Center at Dallas

*Brain & Behavior Research Foundation Scientific Council Member

TeamUp! Events



Linda and Mario Rossi

\$60,000+

Linda and Mario Rossi
5th Annual Chrissy's Wish Memorial Golf Outing
 Manorville, NY

\$20,000+

Harryet, Stuart and Rebecca Ehrlich
4th Annual Taking Strides Against Mental Illness
 Ridgewood, NJ

Ken Harrison
2nd Annual TeamUp! Texas
 Houston, TX

\$10,000+

Drs. Robert and Ann Laitman
Team Daniel: Marathons in Multiple Cities
 Bedford, NY

Curt and Kathy Robbins
Let the Sun Shine Run & Walk
 Cold Spring, MN

David and Linda Tennies
Jason Tennies Memorial Walk for Mental Health
 Chino, CA

Elizabeth Puleo-Tague
19th Annual Michigan NARSAD Golf Classic
 Mt. Clemens, MI

\$1,000+

Hal and Patsy Hollister
2nd Annual TeamUp!
 La Habra Heights, CA

Devin Pray
Tara Savin Memorial Fund
 Burlington, CT

Bonnie Hammerschlag
2nd Annual TeamUp! Maryland
 Bethesda, MD

Benita Shobe
2nd Annual TeamUp! New York
 New York, NY

David and Linda Tennies
2nd Annual TeamUp! California
 Chino, CA

Drs. Robert & Ann and Daniel Laitman
2nd Annual TeamUp! Team Daniel New York
 Bedford, NY

Summer Reid
Remember Johnny
 Orange, CA

Richard F. Person
Paul Morrissey Memorial Auction
 Northeastern U., MA

Laura Faith
Ursinus College Art Fair to Benefit Schizophrenia
 Collegeville, PA

Marian Taylor
Silver Linings For Loved Ones: Brian Taylor Memorial
 Pleasant Grove, UT

Jeffrey Bennett
Frank B. Kellogg Golf Tournament
 Stillwater, MN

Debbie and Justin Miller
Brain-Sells: Recycle
 Los Angeles, CA

Joyce and Lauren Laubach
Tribute to Jenna Laubach
 Wayne, PA

Dr. Thomas B. Coles
Detroit International Marathon
 Detroit, MI

Ramona Rottinghaus
11-11-11 Party
 Waterloo, IA

Kristen DuBose
Running Free With K-Wayne 5K Run/Walk
 Apex, NC

Allen Zeitlin and Charles Hamel
Climbing-4-PTSD
 Nuevo Leon, Mexico

Charles Gates and William R. Berkley
Gingerbread House Auction
 Greenwich, CT

Laina Amoroso
Vinny's Mission
 Broomall, PA

All Other Events:

St. Boniface Episcopal Church Youth Group
Souper Bowl
 Mequon, WI

Rick Ulbrich & Family
Dorothy Minton Charity Jog & Walk
 Indianapolis, IN

John Goldberg and John Rolph
"Fight Teenage Depression - It's Not a Phase"
 Whippany, NJ

Chris Shaw
New England College of Optometry Finals Week Mustache Competition
 Boston, MA

Suzanne and Thomas Neubecker
Neubecker Anniversary Party
 Trenton, MI

Jim Dang
In Pursuit of Happiness: Cross Country Cycle
 Burlington, VT

Board of Directors, Associates, Staff and Volunteers
Folsom Street Events
 San Francisco, CA

Seton Hall University Psychology Club
Bake Sale & Zombie Walk
 South Orange, NJ

Kathryn Vaughn
Dance Times Square Goes Hollywood
 New York, NY



Remember Johnny



11-11-11 Party



In Pursuit of Happiness



Running Free With K-Wayne 5K



Team Daniel

Community

Support Our Campaign *for Productive Lives through community events*



My Team

... Climbs Mountains



Climbing-4-PTSD, Grand Rapids, Michigan

... Walks for Miles



Taking Strides Against Mental Illness
Ridgewood, New Jersey

... Tees Off



Chrissy's Wish Memorial Golf Outing
Manorville, New York

... Recycles



Brain-Sells, Chatsworth, California
(read their blog entry at bbrfoundation.org/blog)

How will you support our cause?

Find out how you can **TeamUp!** and fund research that will lead to advances and breakthroughs.

Remember—**100% of all donor contributions for research are invested in NARSAD Grants.**

Visit bbrfoundation.org/TeamUp or call Special Events: 800.829.8289, 516.829.0091

Contributors

Research Partners Program A Personal Connection between Donors and Researchers



Giving Back to the Community and Championing a Cause

Fidelity Bank and its employees have decided to champion the cause of mental health in young people. They do this by raising funds and contributing money to the SHINE Initiative, a grassroots philanthropic enterprise in Massachusetts that was created to “shine a light” on mental health issues affecting young people. Through Fidelity’s efforts, the SHINE Initiative is able to participate in the Brain & Behavior Research Foundation Research Partners Program and fund a particular scientist’s research grant.

“We wanted to focus on one thing that would make a difference, that would meet a significant unmet need in the community and that would have the enthusiastic support of the workforce.”

In addition to an annual contribution by the bank, employees organize community events to rally around the cause. ‘Keep Your Mind Open’ (KYMO) is an example. It’s a twist on a traditional golf tournament in that it invites participants to bypass a long day on the golf course and gather instead at the “19th hole” for an evening of celebration. Festivities include speakers, auctions, the presentation of a Community Hero award, and even a stand-up performance by a professional comedian. KYMO celebrated its fifth anniversary this past November.

Another event is ‘The Quarter Mile’, a campaign spearheaded by branch managers inviting bank customers to contribute coins (and dollars). The campaign is entering its fourth year and always coincides with Mental Health Month and Children’s Mental Health Awareness Week in May. Throughout the month, employees of the bank conduct in-house fundraisers, such as luncheons and raffles, to complement the contributions of coins.

As for the researcher that SHINE partners with, Fidelity Bank participates in the selection process of NARSAD Grantees each year. The Executive Director of the SHINE Initiative, Paul Richard, works together with Ed Manzi, Chairman and CEO of Fidelity Bank, to select a Massachusetts-based NARSAD Grant project for funding.

Heather C. Brenhouse, Ph.D., an instructor of psychiatry at Harvard University and a member of the Developmental Neuropharmacology laboratory at McLean Hospital, is the first NARSAD Grantee that the SHINE Initiative has now funded twice in the five years of collaboration in the Research Partners Program. She has received two

The goal is not necessarily to give kids drugs, Dr. Brenhouse says. The ideal would be not to have to give them drugs, but by seeing what mechanisms are at play, to design some kinds of behavioral enrichment or behavioral therapy to intervene in these mechanisms and offer protection.



Photo on page 38: Heather C. Brenhouse, Ph.D., SHINE Initiative Investigator; Photo above: Ed Manzi, Fidelity Bank's Chairman & CEO, is pictured at the far left with several Fidelity Bank employees and Paul Richard, Executive Director of the SHINE Initiative at the far right.

NARSAD Young Investigator Grants: in 2008 for a study on the effect of early life stressors in the development of the prefrontal cortex of the brain and in 2011 for continued research into controlling neuroinflammation of the brain as a result of early life stress.

"Dynamic, passionate and committed to her work," is the way Paul Richard describes Dr. Brenhouse. Dr. Brenhouse says, "What I think about at the bench every day, the question constantly on my mind, is how we can protect kids who've been exposed to severe stress from what might become a lifetime of psychiatric disease? Because we do know that many of these diseases are correlated with a history of abuse, neglect or trauma. I want to see what mechanisms in the brain are involved and how we can intervene in those mechanisms. That's the overarching goal of my research."

Stress-induced neuroinflammation—inflammation in the nervous system—combined with genetic predisposition has been implicated in schizophrenia and depression. Dr. Brenhouse has been seeking to understand what might happen if there is an intervention in the inflammatory process. To do so, she injected stressed rat pups with a COX-2 inhibitor, which is a general anti-inflammatory agent similar to ibuprofen. The drug not only prevented the decrease in the number of interneurons in the rats' cortex during adolescence, it also protected the treated animals from the cognitive deficits seen in stressed, untreated adolescent rats.

Dr. Brenhouse first became interested in the effect of neuroinflammation in brain and behavior disorders while working at a biotechnology company during breaks from graduate school, "It was there that I began

When Manzi learned about the Brain & Behavior Research Foundation (then NARSAD), he saw "an automatic fit." The only precondition, he says, "was that the projects we support be in our backyard." A 'backyard' that fortuitously includes Harvard.

working with COX-2 inhibitors," she says, "and the biotech experience helped me to appreciate the value of translational research."

Translational research—research that translates into treatments for disease—is of primary interest to Paul Richard, who oversees the work of the SHINE Initiative. He has spent most of his professional life in the mental health field and in his nonworking time volunteers in recreational activities for children. "I've worked with thousands of kids," he says, "and I see so many whose mental health is ignored, so many who are struggling. It seems so basic to me that if a youngster is abused or neglected, separated from parents at an early age or is witness to something violent or disruptive, it's going to have an impact. It was Dr. Brenhouse's practical approach that so appealed to us."

Another project planned for the bank's backyard, and another first for the SHINE Initiative, is an International Children's Mental Health Awareness Day, scheduled for Spring 2012 at Worcester State University, and will have Heather Brenhouse as the keynote speaker. "It's a huge honor," Dr. Brenhouse says.

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Performance

Combined Statement of Financial Position

December 31,	2011
Assets	
Cash and cash equivalents	\$ 3,677,500
Investments at fair value	9,778,508
Contributions receivable	1,988,306
Other receivable	43,474
Pledges receivable, net	6,797,497
Prepaid expenses	27,923
Assets held in charitable remainder trusts	1,076,214
Furniture, fixtures, equipment, leasehold improvements and proprietary information systems, net	128,669
Security deposits	36,753
	\$ 23,554,844
Liabilities and Net Assets	
Liabilities:	
Accounts payable and accrued expenses	\$ 76,314
Grants payable	20,367,157
Accrued compensation	22,032
Annuities payable	810,412
Charitable gift annuities payable	203,064
Total Liabilities	21,478,979
Net Assets:	
Unrestricted	(13,669,665)
Unrestricted - board designated endowment	4,509,262
Temporarily restricted	5,512,768
Permanently restricted	5,723,500
Total Net Assets	2,075,865
	\$ 23,554,844

2011 FINANCIAL SUMMARY:

This report provides a summary of the financial position and results of the Brain & Behavior Research Foundation. We are deeply grateful for the commitment of Foundation leadership, dedicated staff, volunteers and our strong donor support base that make our vital work possible. We are also indebted to the Foundation Scientific Council, our distinguished research leaders covering virtually every major discipline within brain and behavior science, who volunteer their expertise to select and recommend the most promising grant projects to fund each year.

Despite a challenging economy in 2011, the Foundation continued its work of awarding NARSAD Grants, surpassing the \$275 million mark of investment in mental health research. Proud of this accomplishment, we are even more gratified by the advances and breakthroughs in the understanding of the brain and how to treat mental illness that have been realized through this investment. We count this as the real measure of our performance—helping those living with mental illness to live more full and productive lives.

Combined Statement of Activities

Year Ended December 31,	2011
Support and Revenue:	
Contributions	\$ 9,362,569
Contribution of services	1,076,856
Bequests	2,680,859
Net realized and unrealized gains (losses) on investments	(249,223)
Net appreciation (depreciation) of assets held in charitable remainder trusts	(98,382)
Dividend and interest income	468,840
Annuities due	68,929
Total Support and Revenue	13,310,448
Expenses:	
Program Services:	
Research grants and awards	5,097,824
Program support	3,647,092
Scientific advancement	1,421,414
Total Program Services	10,166,330
Supporting Services:	
Administration*	1,466,487
Fundraising*	811,255
Total Supporting Services	2,277,742
Total Expenses	12,444,072
Change in Net Assets	866,376
Net Assets, beginning of year	1,209,489
Net Assets, end of year	\$ 2,075,865

* All administration and fundraising expenses are funded by specially designated grants.

With the ambition of the Foundation's multi-year fundraising program, the Campaign for Productive Lives, we endeavor to accelerate these research accomplishments. In order to spark our efforts, we are asking our dedicated donors and friends to join in this unparalleled fundraising initiative to build on our legacy of funding the best research.

Thanks to the generosity of two family foundations, all supporting services were once again underwritten in 2011. This allows for donations targeted for research to go directly to funding NARSAD Grants. The financial report shown herein has been summarized from our 2011 audited financial statements. The Foundation's complete audited financial statements and our most recent IRS Form 990 are available online at bbrfoundation.org or contact the office at 800.829.8289 for copies of the material.

