

Top 10 Discoveries in 2013 by NARSAD Grantees

Kirsty Spalding, Ph.D.

*Karolinska Institutet,
Stockholm, Sweden*

2007 NARSAD YI

Retrospective Analysis of Cell Turnover in the Brain, in Schizophrenia and Mood Disorders



Basic Research: General Mental Illness

Innovative Methodology Quantifies New Neurons in Adult Humans

By carbon dating birth dates of neurons in the human hippocampus*, Dr. Spalding and team have, for the first time, been able to identify the number of new neurons generated in adult brains, furthering the idea that new neurons support cognitive functions throughout life and reinforces the possibility of enhancing this process to treat psychiatric illnesses.

Journal: *Cell*, June 6, 2013

Marina Picciotto, Ph.D.

Yale University

2004 NARSAD II

Nicotinic Acetylcholine Receptors: Novel Targets for Antidepressant Development



Next Generation Therapies: Depression

Discovery of New Depression Trigger and Treatment Target

Dr. Picciotto led a team of researchers in the discovery that a signaling chemical called acetylcholine may be central in causing depression, leading to a new hypothesis that it is the disruption of acetylcholine, and not serotonin*, which sets depression in motion. Targeting acetylcholine disruption may be a way to treat the root cause of depression and could lead to more effective treatments. **Journal:** *PNAS*, February 11, 2013

Rene Hen, Ph.D.

*Columbia University
Medical Center*

2003 NARSAD DI

Antidepressants and Neurogenesis in the Adult Hippocampus



New Technologies: Anxiety

New Way to Reduce Anxiety Symptoms Discovered

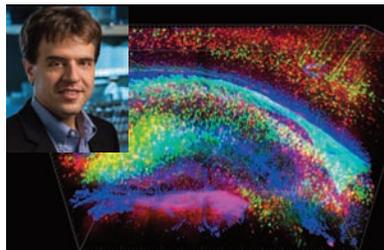
Using optogenetics*, Dr. Hen led a group of researchers in the discovery that selective activation of the dentate gyrus, a portion of the hippocampus, can reduce anxiety in people with post-traumatic stress disorder and panic disorder without negatively affecting the ability to learn. By targeting this area with medication or deep brain stimulation it may be possible to relieve anxiety with no negative effects. **Journal:** *Neuron*, March 6, 2013

Karl Deisseroth, M.D., Ph.D.

Stanford University

2005 NARSAD YI

Mechanism and Significance of Excitation-Neurogenesis Coupling



New Technologies: General Mental Illness

3D Imaging Technology Promises Breakthroughs in Brain Research

Dr. Deisseroth and team developed CLARITY, a new imaging technology that provides high-resolution, 3D images of the brain making it possible for scientists to simultaneously look at "the big picture" and fine details of the brain's complex fine wiring and essential features. Rendering the brain transparent, may lead to new insights into brain structure and function shedding light on the underlying causes of mental illnesses. **Journal:** *Nature*, April 10, 2013

Scott A. Schobel, M.D.

*Columbia University
Medical Center*

2008 NARSAD YI

Cross-Species Imaging of Hippocampal Subregion Metabolism in Schizophrenia and Mouse Models of Disease



Early Intervention: Schizophrenia

Foundation-Funded Study Identifies Schizophrenia Early Warning Sign

Using neuroimaging, Dr. Schobel discovered that high levels of the neurotransmitter glutamate in the hippocampus region of the brain may cause the transition to psychosis in people at high risk for developing schizophrenia. This suggests that increased glutamate activity can be an early warning sign for schizophrenia, and that controlling glutamate levels may be an effective preventive and/or therapeutic strategy. **Journal:** *Neuron*, April 10, 2013

Top 10 Discoveries *(continued)*

Gail L. Daumit, M.D., M.H.S.

Johns Hopkins University

2010 NARSAD II

Mobile Phone Interactive Technology for Weight Loss: A Pilot Study in Persons with Serious Mental Illness



Next Generation Therapies: Depression

Behavioral Therapy Program Achieves Weight Loss for People with Mental Illness

Project Achieve, the first weight loss clinical trial with people with serious mental illnesses, was led by Dr. Daumit to account for cognitive and behavioral challenges present in mental illness. She found that people with serious mental illnesses can lose weight and keep it off through a modified lifestyle intervention program. **Journal:** *The New England Journal of Medicine*, April 25, 2013

Joseph T. Coyle, M.D.

Harvard Medical School

2004 NARSAD DI

Defining the Role of D-serine, An NMDA Receptor Modulator, in Cognition and Behavior



Basic Research: Schizophrenia Negative Symptoms
Researchers Find Way to Increase Neuroplasticity and Treat "Negative" Symptoms of Schizophrenia

Dr. Coyle and team were able to reverse schizophrenia-like negative* symptoms in genetically engineered mice by giving them D-serine, one of two molecules required to activate NMDA receptors. This supports the theory that low activity in these receptors can cause negative symptoms in people with schizophrenia and indicates they may be reversible. **Journal:** *PNAS*, May 31, 2013

Helen S. Mayberg, M.D.

Emory University

2002 NARSAD DI

Deep Brain Stimulation for Refractory Major Depression



Next Generation Therapies: Depression

Historic Study Finds Brain Scans Can Guide Depression Treatment Decisions

Using PET scan imaging, Dr. Mayberg and colleagues identified specific activity in the right anterior insula of the brain that can potentially predict whether people with major depressive disorder will better respond to antidepressant medication or psychotherapy. A patient's biology rather than behavioral symptoms could decide treatment. **Journal:** *JAMA Psychiatry*, June 12, 2013

Joan L. Luby, M.D. and Deanna Barch, Ph.D.

Washington University School of Medicine

2008 NARSAD II (Joan Luby)

Serotonin Transporter Polymorphisms and Course of Preschool Onset Depression



Dr. Luby

Dr. Barch

New Technologies: Depression

fMRI Brain Scans May Help Diagnose Depression in Preschoolers

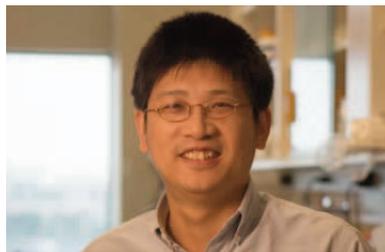
In a first-of-its-kind study, Drs. Luby and Barch used functional MRIs to compare images of activity in the amygdala* in non-medicated preschoolers with depression and preschoolers who were not depressed. Scans of preschoolers with depression showed more activity in the amygdala, providing the earliest evidence yet of changes in brain function in children with depression. **Journal:** *Journal of the American Academy of Child & Adolescent Psychiatry*, July 2013

Hongjun Song, Ph.D.

Johns Hopkins University

2008 NARSAD II

Role of sFRP3 in Antidepressant-Induced Adult Hippocampal Neurogenesis and Behavior



Next Generation Therapies: Depression

Discovery of How Antidepressants Work Leads Toward Improved Depression Treatments

Dr. Song and co-researchers have discovered a protein that helps electroconvulsive therapy (ECT) and antidepressant medications work, possibly enabling predictive tests of an individual's response to antidepressant treatment based on their genetic code and providing a new target for the development of improved treatments. **Journal:** *Molecular Psychiatry*, December 4, 2012

Type of NARSAD Grant: YI - Young Investigator | DI - Distinguished Investigator | II - Independent Investigator

***hippocampus:** an area of the brain key to memory and learning.

***serotonin:** a signal-carrying chemical of which low levels have long been associated with depression.

***optogenetics:** a cutting-edge technology that allows scientists to selectively activate neurons in the brain and observe the corresponding behavior.

***negative symptoms of schizophrenia:** decreased motivation, lack of attention, emotional flatness, memory loss, social withdrawal.

***amygdala:** region of the brain that controls emotional processing and regulating.