

**DESIGNED TO ENCOURAGE CREATIVE, HIGH-RISK SCIENCE—**

and stimulate interdisciplinary research between the basic sciences and clinical investigation—these annual awards will ensure that Stanford School of Medicine faculty members continue to advance the most innovative science. The program provides two-year grants of up to \$200,000 to support groundbreaking projects across an array of translational and clinical sciences. The following 11 proposals were selected from a highly competitive applicant pool.

**2017 TRANSLATIONAL & CLINICAL INNOVATION AWARDS**

Changing the Gut Microbiome  
to Decrease Inflammation in Older Adults

Connecting Gene Mutations with Disease  
Symptoms in Hypertrophic Cardiomyopathy

Deep Learning to Individualize  
Palliative Cancer Treatment

Electronic Skin to Restore  
Sensation for Amputees

Exploiting Sugars to Elude  
a Rare Genetic Defect

Precision Health for Depression

Precision Treatment for  
Acute Myeloid Leukemia Therapy

Rapid Testing for Antibiotic Resistance

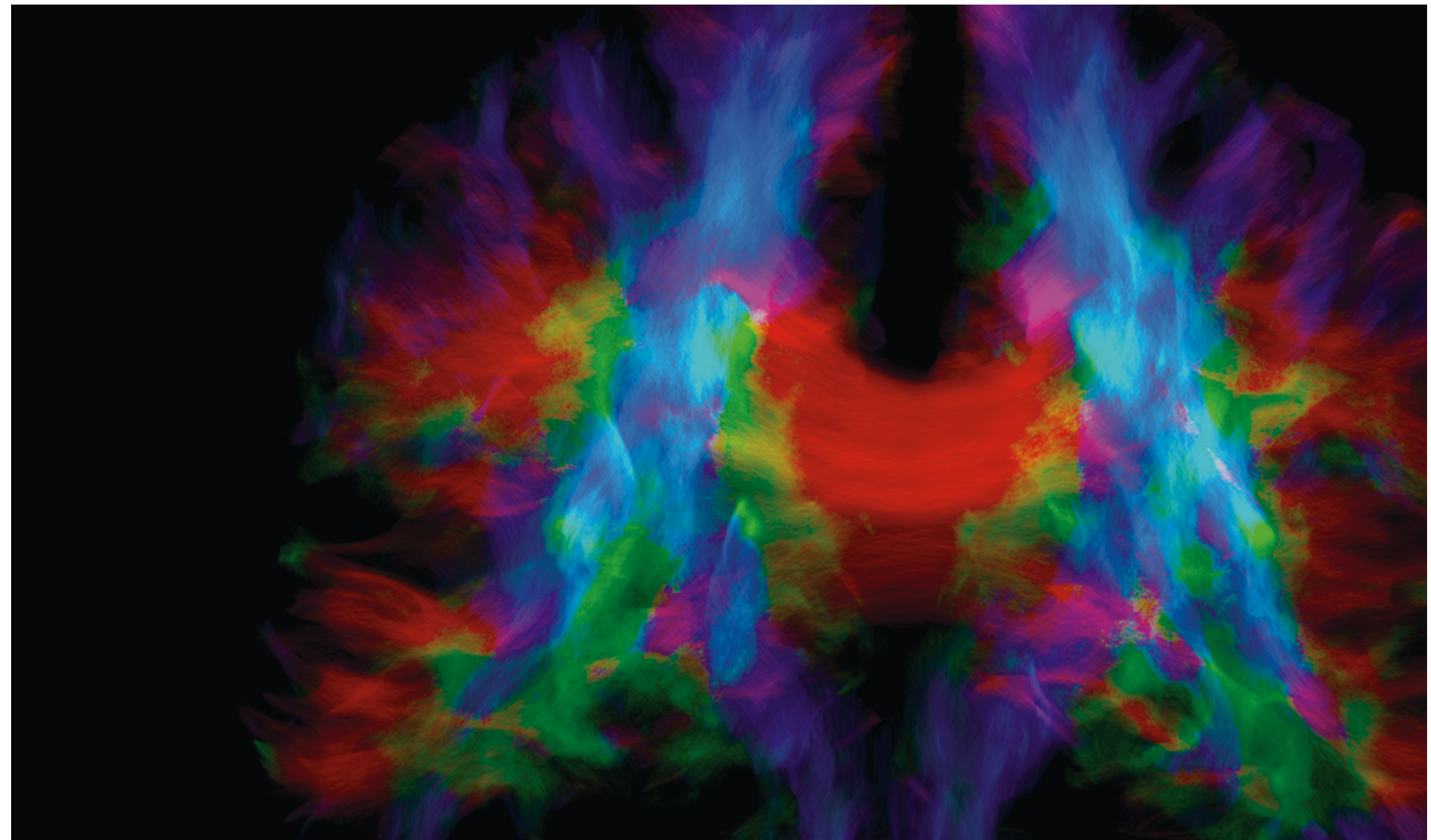
Restoring Sight to the Blind

Toxin Accumulation in Kidney Failure

Unlocking the Healing and Regenerative  
Power of Ribosomes

*A \$2.2 million gift funds all 11 projects. A \$200,000 gift funds 1 project.*

*Nerve fiber pathways measured with diffusion MRI in the brain*



# Personalizing Treatment by Targeting Brain Circuitry with Advanced Imaging Technology

## THE RESEARCHERS

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**Trisha Suppes, MD, PhD**, Professor, Psychiatry and Behavioral Sciences (General Psychiatry and Psychology-Adult) **AWARDS** 2009–2011 Board of Councilors, International Society for Bipolar Disorders Councilor, 2008 Depression and Bipolar Support Alliance Gerald L. Klerman Senior Investigator Award **EDUCATION** Dartmouth, MD, '87, UCLA, PhD in Anatomy/Neurophysiology, '80



**Leanne Williams, PhD**, Professor, Psychiatry and Behavioral Sciences (Major Laboratories and Clinical and Translational Neurosciences Incubator) **AWARDS** 2016 Stanford University Chairman's Award for Advancing Science, 2012 Ernst Strungmann Institute for Neuroscience in Cooperation with Max Planck Institute Award: "Schizophrenia evolution and synthesis," **EDUCATION** University of New England, Australia and with British Council scholarship to Oxford University, PhD in Cognitive Neuroscience, '96



**Max Wintermark, MD**, Professor, Radiology (General Radiology), and, by courtesy, Neurology, Neurosurgery, and Psychiatry and Behavioral Sciences **AWARDS** 2016 Castle Connolly Top Doctor, 2015–2017 Chair of the NIH StrokeNet Imaging Working Group, 2013–2017 Chair of the Public Information Committee of the Radiological Society of North America, 2013–2017 Chair of the Research Committee of the American Society of Neuroradiology **EDUCATION** University of Lausanne, Switzerland, MD, '98

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**The goal of this research** is to revolutionize our approach to treating depression by identifying underlying brain circuitry disruptions and malfunctions in each patient and guiding personalized treatments that correct them.

## THE CHALLENGE

Depression impacts 1 in 10 people and is the leading cause of disability globally. The antiquated "trial and error" approach to treatment leaves most patients suffering for years, leading to chronic disability, treatment resistance, and often suicide.

While there are many drugs to treat depression, guessing who will respond to which medications is a shot in the dark for psychiatrists. Depression is a catch-all diagnosis that lumps together patients experiencing a wide range of symptoms with different underlying brain dysfunction. To improve treatment and get the right treatment to the right person quickly will require greater understanding of how disrupted brain circuitry causes specific symptoms in each patient, which will, in turn, guide treatments that correct underlying pathology.

## THE INNOVATIVE RESEARCH

Dr. Williams has pioneered functional MRI (fMRI) technology to visualize brain circuitry in research subjects' brains, revealing four subcategories of depression. Each biotype is defined by the disruption of distinct neural networks, which causes

symptoms dominated by (1) anxiety, (2) stress and fear, (3) hopelessness, or (4) rumination. Dr. Williams selects treatment for each individual subject based on their biotype.

With this funding, Dr. Williams and her team want to translate these findings from the lab to the clinical world and allow all patients with depression to benefit from this approach. They will perform the world's first clinical trial using fMRI-based biotypes to guide treatments for depression. She will pair each biotype to specific treatments that preliminary experiments suggest are optimal: anxiety with SSRIs (ie., Prozac), stress and fear with SNRIs (ie., Cymbalta), hopelessness with drugs targeting dopamine reward pathways, and rumination with Transcranial Magnetic Stimulation (TMS). Leveraging expertise in neuroscience, mental health, neuroimaging, and computational analysis, she will refine this precision mental-health approach to improve patient outcomes.

## THE POTENTIAL IMPACT

These studies will revolutionize clinical psychiatry by providing tools to better diagnose and treat depression in individual patients. These advances will transform millions of lives and alleviate the crushing economic and social costs of depression. Functional MRI-based precision mental health may also transform treatment of many other psychiatric diseases, which also suffer from lack of scientific understanding and diagnostic tools.