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It is a tremendous pleasure and honor for me to write my first introduction to the Annual Report of our scientific activities at the Laureate Institute for Brain Research (LIBR). I have been at LIBR for only eight months and have been enormously energized by the opportunity to make a real difference using neuroscience to improve the life of patients with mental illness. At the same time, I recognize this is a very challenging task, which cannot be accomplished overnight. However, with a thoughtful eye on what is doable, we are hoping to make a measurable impact on ways to assess and treat patients within five years.

2014 has been a time of change for LIBR. In addition to the initiation of my tenure as the Scientific Director and President in May 2014, we had several Principal Investigators join LIBR and others leave for prestigious positions. At the end of 2013 and the beginning of 2014, Dr. Justin Feinstein moved from the California Institute of Technology, in Pasadena, to Tulsa to focus on studying how affecting the brain-body connection (interoception) using float technology might help to develop new treatments for anxiety and eating disorders. Moreover, in August, Dr. Robin Aupperle moved from the University of Kansas to LIBR to work on developing new, more targeted, behavioral interventions that are focused on reducing specific symptoms in anxiety and depression. Finally in early 2015, Dr. Sahib Khalsa moved from the University of California Los Angeles to set up a sophisticated pharmacological laboratory aimed at studying how to modulate the brain-body connection in patients with eating disorders. In September of 2014, Dr. Patrick Bellgowan left the Institute to become a Program Director at the National Institute of Neurological Disorders and Stroke.

The Principal Investigator, the leadership team and the Scientific Director have collaborated throughout the year in work groups that met several times, which culminated in a retreat meeting, in the Fall of 2014, to develop a coherent theme for LIBR. What emerged is a focused program of research aimed at making basic discoveries impactful for assessment and treatment of patients with psychiatric illness. We termed this the “Pipeline of Mental Health Innovation” and divided the process of finding new assessments and treatments into four stages: (a) discovery, (b) elaboration, (c) development and (d) implementation. Moreover, this structure led to the development of a pilot project program that will support studies that aim to directly improve mental health assessment and treatment.

We have started a major study in 2015, the Tulsa 1000, or T-1000. The goal for this study is to determine whether neuroscience-based measures can be used to predict outcomes in patients with mental illness. In particular, we are trying to determine what factors best predict who will respond well to a particular treatment. The study is a definitive step towards developing a science-based personalized medicine approach in mental health. Unfortunately, mental health treatment providers are still using guesswork and intuition in matching treatments to patients. As a consequence, mental health treatment is fundamentally a trial and error endeavor, which can result in prolonged suffering if treatments do not work. The hope is that we will be able to use scientific approaches to more precisely match patients to treatments.

At the same time, the Institute supports a number of studies that aim to determine whether some forms of depression are a consequence of a change in the immune system. Dr. Jonathan Savitz is working diligently on elaborating the biological basis of changes in the immune response in depression. Dr. Paul Hamilton is investigating whether the brain of depressed individuals shows subtle signs of inflammation. In addition, LIBR is at the forefront of using MRI technology to directly influence the brain. The emerging technology of neuromodulation, which is being developed by Dr. Jerzy Bodurka, may soon allow us to have patients directly modulate brain areas that are important for controlling mood. Finally, a better delineation of different types of depression is an important step towards more targeted treatments. Dr. Kyle Simmons is using a combination of sophisticated behavioral analysis, functional brain imaging, and clinical assessment to understand why some people lose their appetite when they get depressed and others start eating more and gain weight.

In 2014, LIBR underwent significant renovations and extensions. Most notably, LIBR is now the world’s only Neuroscience Institute that is able to conduct functional brain imaging studies with individuals that undergo float therapy. The float clinic opened at the end of 2014 and is based on the idea that removing external stimuli such as sounds or sights allows the individual to reconnect his or her brain to the body and regain a new mental balance. Up to now there has only been anecdotal evidence that float therapy might help individuals with anxiety and depression. We are positioned to rigorously test this question and to determine which brain areas are responsible for the possible treatment effect of floating.

In addition to the float clinic, Dr. Robin Aupperle is establishing new interventions that are based on cognitive training not unlike Lumosity games, which have become so popular recently. The goal of her research is to determine whether and how these types of training work, who might benefit most from these types of interventions and whether one can predict early on whether a patient is on the road to improvement. Taken together, this has been an incredibly exciting first year for me; I am very much looking forward to a productive 2015 and towards making a tangible difference in the lives of those with mental illness.

MARTIN PAULUS, M.D.
Scientific Director and President
Laureate Institute for Brain Research

LETTER FROM THE PRESIDENT
LIBR MISSION
A clinical neuroscience research institute that recognizes the dignity of each person, and leverages leading talent and technology to discover the causes of and cures for disorders of mood, anxiety, eating and memory.

SPECIFIC AIMS
• Bring to bear a multidisciplinary research program aimed at illuminating the pathophysiology of neuropsychiatric disorders
• Develop novel therapeutics, cures and preventions to improve the well-being of persons who suffer from or are at risk for neuropsychiatric illness
• Foster collaboration among scientists, clinicians, and institutions engaged in research that enhances wellness and alleviates suffering from mental illness

HISTORY
The Laureate Institute for Brain Research opened on May 1, 2009, and currently houses a multidisciplinary team of scientists and clinical research staff who apply neuroimaging, genetic, pharmacological and neuropsychological tools to investigate the biology of neuropsychiatric disorders. The Institute’s creation was supported by The William K. Warren Foundation for the purpose of conducting studies aimed at developing more effective treatments or prevention strategies for these disorders. The studies are led by scientists from diverse backgrounds, including physics, cognitive neuroscience, psychology, psychiatry, developmental neuroscience, computer science and genetics.

LIBR by the Numbers

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<th>Principal Investigators</th>
<th>Associate Investigators</th>
<th>Staff Scientists</th>
<th>Post-doctoral Fellows</th>
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<th>Participants Enrolled Across All Studies</th>
<th>Active Grants and Clinical Trials</th>
<th>Graduate Students</th>
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<td>1,334</td>
<td>18</td>
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<tr>
<th>New Externally Funded Grants</th>
<th>In External Grant Funding</th>
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<tr>
<td>4</td>
<td>$3,378,335</td>
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<td>699</td>
<td>871</td>
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<th>Distinguished Speakers for The William K. Warren Foundation 2014 Lecture Series</th>
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<th>Inquiries for Study Participation</th>
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<tr>
<td>8</td>
<td>43</td>
<td>1,859</td>
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The goal for LIBR is to generate impactful research (knowledge) that makes a difference in mental health. That is, the principle product of LIBR is knowledge building. In order for knowledge to be impactful, it needs to change behavior of the stakeholders and as a consequence improve the quality of life of the mentally ill. This change in behavior could be (a) applying a new treatment, (b) providing information to the patient that affects their behavior to improve outcomes, (c) changing the strategy of treatment based on novel assessments, (d) providing information about likely outcomes in the future. A critical task in creating impactful knowledge at LIBR is to shorten the gap of time between the acquisition of knowledge and the implementation in clinical practice. This gap of time will be greater if production of knowledge focuses on basic processes underlying the pathophysiology of the disorder. Therefore, we need to be mindful of creating knowledge that will affect mental health in the short-term as well as in the long-term.

**THERE IS A NEED FOR:**

1. Earlier detection of the development and/or exacerbation of mental health conditions, e.g. early but not late stages of mood disorder may be treatable with an anti-inflammatory agent.

2. Sensitive and specific tests for severity of mental health conditions, e.g. predicting relapse may allow the clinician to intervene early.

3. Earlier and sensitive detectors of treatment effects of interventions for mental health conditions, e.g. rather than waiting 4-6 weeks for an antidepressant to show significant effects, early changes may help to select treatments that work faster.

4. Detection of emergence of side effects.

5. More effective interventions for anxiety, depression, and substance use disorders.

**BEHAVIORAL PROCESSES**

This research theme focuses on identifying the physiological bases for drives and behaviors that contribute to the development, maintenance, or recovery from neuropsychiatric dysfunction to improve the assessment and treatment of mental and physical health.

**NEUROIMAGING**

This research theme focuses on the existing and emerging tools and techniques in multimodal imaging.

**NEUROMODULATION**

This research theme focuses on real-time feedback modalities to change dysfunctional processes in psychiatric populations.

**PSYCHOPHYSIOLOGY**

This research theme focuses on the use of physiological measures to examine the connection between body and brain.

**BIOASSAYS**

This research theme focuses on the use of biochemical measures, ranging from inflammatory markers to microbiome assessments.

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**LIBR Leadership**

- Martin Paulus, M.D.
  Scientific Director and President
- Tom Cooper, MBA
  Chief Executive Officer
- Colleen McCallum, MBA
  Chief Operating Officer
- Jerzy Bodurka, Ph.D.
  Chief Technology Officer

**LIBR Administrative Staff**
FUNDING SOURCES

ACTIVE GRANTS

National Institute for Mental Health (NIMH)
The neural bases of pathological food perception and choice in major depression
05/01/2012 – 04/30/2017 PI: Kyle Simmons, Ph.D.
Neuroimaging abnormalities in major depressive disorder: effect of inflammation
09/12/2012 – 07/31/2017 PI: Jonathan Savitz, Ph.D.
Inflammatory transcripts, genes, and positive valence system function in anhedonia
09/01/2012 – 07/31/2016 PI: Jerzy Bodurka, Ph.D.
Effects of amygdala neurofeedback on depressive symptoms and processing biases
04/01/2014 – 03/31/2016 PI: Kymberly Young, Ph.D.
Department of Defense (DoD)
Emotion regulation training for treating warfighters with combat-related PTSD using real-time fMRI and EEG assisted neurofeedback
09/30/2012 – 09/29/2015 PI: Jerzy Bodurka, Ph.D.
Brain and Behavior Research Foundation (formerly NARSAD)
Neurophysiological mechanisms of pain modulation and emotion processing in fear, anxiety, and depressive disorders
01/15/2013 – 01/14/2015 PI: Ruben Alvarez, Ph.D.
Examining the neural basis of interoceptive fear
01/15/2013 – 01/15/2017 PI: Justin Feinstein, Ph.D.
Interoceptive learning and recall in major depression
01/15/2013 – 01/15/2017 PI: Kyle Simmons, Ph.D.
Clinical trial of real-time fMRI amygdala neurofeedback as a depression treatment
01/15/2013 – 01/15/2017 PI: Kymberly Young, Ph.D.
Oklahoma Tobacco Research Center (OTRC)
Mapping and modifying the influence of interoceptive and reward neurocircuitry in nicotine craving
03/01/2012 – 06/30/2016 PI: Kyle Simmons, Ph.D.
Neurophysiological underpinnings of nicotine dependence and mood disorders
03/01/2012 – 06/30/2016 PI: Nuno Malak, Ph.D.
Antidepressant effects and smoking cessation in depressed smokers with minocycline and/or aspirin
03/01/2012 – 06/30/2014 PI: Jonathan Savitz, Ph.D.

COMPLETED GRANTS

Oklahoma Center for the Advancement of Science and Technology (OCAST)
Transcranial magnetic stimulation for Mal de Debarquement syndrome
09/09/2013 – 06/30/2016 PI: Yoon-Hee Cha, M.D.
Air Force Office of Scientific Research (AFOSR)
Cyber trust and suspicion
09/30/2012 – 01/29/2015 PI: Paul Hamilton, Ph.D.
National Institute on Deafness and Other Communication Disorders (NIDCD)
Functional neuroimaging and transcranial magnetic stimulation in MdDS
08/16/2012 – 02/28/2015 PI: Yoon-Hee Cha, M.D.
Stanley Medical Research Institute
Minocycline and aspirin in the treatment of bipolar depression
09/30/2011 – 06/30/2014 PI: Sheldon Preskorn, M.D.
MdDS Balance Disorder Foundation
Development of biomarkers to refine neuromodulation treatment targets in MdDS
2014 – 2015 PI: Yoon-Hee Cha, M.D.

WILLIAM K. WARREN FOUNDATION FRONTIERS IN NEUROSCIENCE 2015 LECTURE SERIES

January 6, 2015 Amit Etkin
March 3, 2015 Jitender Sareen
April 14, 2015 Monique Ernst
May 5, 2015 David Glahn
June 2, 2015 Charlie Nemeroff
Patrick Kennedy,
Former U.S. Representative,
Visited LIBR

On September 19, 2014, LIBR had the honor of a visit from former U.S. Representative Patrick Kennedy, a longtime champion and advocate for the mentally ill.

He took a tour of the LIBR facilities and engaged in a round table discussion with LIBR researchers about future directions in research, how to implement findings into clinical care and ways to expedite new treatments.

The Mental Health Parity and Addiction Equity Act (MHPAEA) was the signature achievement of Patrick Kennedy’s 16 years in Congress. Its passage in 2008 was the result of many years of perseverance to overcome institutionalized insurance discrimination against persons with mental illnesses and substance use disorders.

John-Kelly Warren,
CEO of The William K. Warren Foundation,
Raced for LIBR

On October 11, 2014, John-Kelly Warren, CEO of The William K. Warren Foundation, successfully completed the IRONMAN World Championship in Kailua-Kona, Hawaii. His fundraising efforts for the event helped contribute $30,000 to mental health research at the Laureate Institute for Brain Research.

John-Kelly Warren wrote that he raced in the World Championship “...because I can and am motivated by those who can’t, with purpose in hopes that I can raise awareness to give a voice to those without, for those affected by mental illness and their families because I have seen the effects of this disease on my family, my friends and the community, to help those afflicted with mental illness help themselves. That is the purpose of The Laureate Institute for Brain Research (LIBR), a research organization rooted in Tulsa, Oklahoma, founded by my family’s Foundation and teamed with investigators from all over the world.”

Congratulations to John-Kelly for his amazing achievement in the triathlon.

Zarrow Mental Health Symposium

Drs. Paulus, Feinstein, Simmons and Khalsa attended the 20th annual Zarrow Mental Health Symposium in September 2014. Their talks during the session on “Improving Mental Health Through Neuroscience” sparked an increased interest from the community in the ongoing research efforts at LIBR.

The lectures were designed to help attendees: (1) Understand that the way the brain systems become dysfunctional does not neatly fit into current diagnostic criteria for psychiatric disorders, (2) Learn about how the NIMH Research Domain Criteria (RDoc) can be used to discover new biological markers for the assessment and treatment of psychiatric patients, (3) Learn about the concept of interoception and its relevance to mental health, (4) Identify the neural systems that process interoception and introduce research documenting how disturbances within these systems can lead to mental illness and (5) Learn about a novel behavioral intervention that aims to promote mental health.

LIBR Open House

In November 2014, LIBR welcomed the Tulsa community to our first Open House event. We greatly enjoyed meeting everyone who visited us to learn more about the ongoing research at LIBR, meet the scientists and participate in an interactive guided tour of the facilities.

Our keynote speakers, Drs. Martin Paulus, Jerzy Bodurka and Justin Feinstein shared presentations about their research work.

Martin Paulus, M.D.
“T-1000: How LIBR Will Change Mental Health in the 21st Century”

Jerzy Bodurka, Ph.D.
“Exploring Human Brain Activity with Non-Invasive Multi-Modal Imaging”

Justin Feinstein, Ph.D.
“Introducing the LIBR Float Clinic and Research Center”

Thank you to everyone who participated in the event and for your continued support of our mission to improve the lives of those living with mental illness.

In the News

In October 2014, LIBR had the pleasure of welcoming Terri White, commissioner for the Oklahoma Department of Mental Health and Substance Abuse Services (ODMHSAS), for a tour of our research facilities and discussion on ways her department can collaborate with LIBR to help the mentally ill in Oklahoma. She is a passionate advocate for individuals experiencing mental illness and addiction.

Because of her leadership, ODMHSAS has become nationally known for its children’s behavioral health services; community-based treatment programs; technological innovations such as “telepsychiatry;” and the integration of behavioral healthcare into primary healthcare settings.

Terri White
Visited LIBR

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American College of Neuropsychopharmacology Conference Overview

In December 2014, several of our LIBR investigators attended the annual American College of Neuropsychopharmacology (ACNP) meeting in Phoenix, Arizona. ACNP is one of the world’s leading forums for the exchange of cutting edge scientific information about the brain, behavior and psychotropic drugs.

Dr. Kymberly Young presented a poster of her work on amygdalectomy during autobiographical memory using neurofeedback and fMRI.

Dr. Kyle Simmons was a presenter in a panel discussion on reward circuitry dysfunction in mood disorders.

Dr. Martin Paulus presented during the “Translating Clinical Neuroscience into Clinical Practice” panel discussion.

Dr. Robin Aupperle presented a poster on the relationship between cognitive dysfunction in combat veterans and decreased anterior cingulate activity.

Society For Neuroscience Conference Overview

The annual Society for Neuroscience (SFN) conference in Washington, D.C. took place in November 2014. SFN is the largest neuroscience conference in the world, with more than 30,000 attendees from 80 countries. The following abstracts were presented by LIBR researchers.

• Peripheral blood inflammatory markers associated with concussion severity and recovery in collegiate athletes

• Striatal dopamine receptor correlation patterns in human obesity suggest reduced food reward and motivation with enhanced habitual opportunistic eating

• Eating alters insula functional connectivity to prefrontal and subcortical regions underlying behavioral and appetitive responses to foods

• The inflammation-related gene CITED2 modulates the relationship between the dopamine-related gene NR4A2 and subgenual anterior cingulate cortical thickness in Major Depressive Disorder

• Selective serotonin reuptake inhibitor, electro-convulsive therapy, and repetitive transcranial magnetic stimulation treatments affect distinct neural systems in Major Depressive Disorder: A comprehensive meta-analytic investigation

• Brain responses to unpredictable threat in individuals at high risk for depression

• The relationship between food cognitive restraint and brain activity while anticipating and receiving food rewards

• Resting-state fMRI demonstrates that illness severity in anorexia nervosa is associated with a lack of differentiation between sensory and fronto-parietal neural networks

• Striatal dopamine receptor correlation patterns in human obesity suggest reduced food reward and motivation with enhanced habitual opportunistic eating

Visiting Scientists

LIBR welcomed several visiting scholars to our Institute in 2014.

Dr. Thomas Fine, from the Department of Psychiatry at the University of Toledo presented at the LIBR journal club series. Dr. Fine was one of the seminal float researchers in the 1980’s. He published a number of studies documenting the physiological effects of floating, including significant reductions in blood pressure in patients with chronic hypertension, as well as large reductions in blood cortisol and increases in EEG theta during the float experience.

Dr. Irene Perini from the University of Gothenburg, Institute of Neuroscience and Physiology, in Vaestra Goeatland, Sweden, visited the Laureate Institute for Brain Research from November 11 – 14, 2014. She gave a presentation entitled “Human Nerve Growth Factor Mutation Alters Neural Pathways for Behavioral Responses to Acute Pain.”

Dr. Paul Davenport, Distinguished Professor at the University of Florida, visited the Laureate Institute for Brain Research from November 6 – 9, 2014. His research focuses on the control of breathing, including basic brain mechanisms, reflex-to-cognitive respiratory neurophysiology, pulmonary function assessments and rehabilitation of respiratory muscles.
In 2014, LIBR built the Float Clinic and Research Center (FCRC), the first laboratory of its kind in the world. The FCRC, directed by Dr. Justin Feinstein, contains two custom-designed fiberglass floatation pools, including an open pool and an enclosed pool. The float pools were manufactured in the United Kingdom by Colin Stanwell-Smith, an experienced engineer who has been designing and customizing float pools for nearly two decades. Starting this year, the FCRC will commence an exciting program of research that aims to systematically investigate the effects of floating in individuals who suffer from anxiety, addiction, or anorexia.

Both circular pools are the same size (8 feet in diameter) and contain 11 inches of reverse-osmosis water mixed with 2,000 pounds of USP grade Epsom salt (magnesium sulphate), creating a salt water solution with a specific gravity of 1.3, making the water denser than the Dead Sea. A shower is located in each float room, as well as a private bathroom. Each float pool creates an environment with minimal visual, auditory, tactile, proprioceptive, and thermal input to the brain. While both float pools dramatically reduce external sensory information, it is important to note that each floater is in full control over the experience.

Over the past 5 years, floating has witnessed a widespread resurgence. So-called “float centers” have started to open around the world, with a combined control room and all necessary auxiliary equipment. The neuroimaging facilities at LIBR are entirely dedicated to research.

2014 was a year of growth and expansion for our LIBR office building and neuroimaging facilities. We expanded the second level of the LIBR building with an additional 4,800 square feet of offices and conference rooms. In addition, we expanded the MRI facility to accommodate the growing number of research projects at LIBR. A second Discovery MR750 3T MRI GE scanner was installed in May of 2014 into an additional 1,850 square feet of space, along with a combined control room and all necessary auxiliary equipment. The neuroimaging facilities at LIBR are entirely dedicated to research.

Kymberly Young Ph.D. received a five-year career K99/R00 development grant from the National Institute of Mental Health to investigate a new neurobehavioral treatment for major depressive disorder.

LIBR researchers: Maurizio Bergamino, Ph.D. and Han Yuan, Ph.D. were awarded Trainee Travel Awards to The ISMRM meeting in Milan.

Drs. Justin Feinstein, Kyle Simmons and Kymberly Young were awarded NARSAD Young Investigator Awards from the Brain and Behavior Research Foundation. The projects that received funding support from the foundation were: Justin Feinstein, Ph.D.: “Examining the Neural Basis of Interoceptive Fear,” Kyle Simmons, Ph.D.: “Interoceptive Learning and Recall in Major Depressive Disorder,” and Kymberly Young, Ph.D.: “Clinical Trial of Real-Time fMRI Amygdala Neurofeedback as a Depression Treatment.”

Currently over 200 float centers in America and nearly 600 float centers worldwide. Despite this resurgence, very little research has systematically investigated the effects of floating. The most replicated finding thus far has been the significant reduction in levels of stress and anxiety as measured from pre- to post-float. Consistent with the data, floating has been shown to significantly decrease blood pressure, heart rate, and cortisol. A recent meta-analysis of 27 float studies found a large overall effect size for the amount of stress reduction, with the vast majority of research focused on healthy populations. Thus, floating shows great promise as a tool for reducing the deleterious effects of stress, but much more research needs to be conducted in clinical populations.
SELECTED PUBLICATIONS


RESEARCH COLLABORATORS

- Wayne Drevets, M.D. Janssen Pharmaceuticals, Inc.
- Jerzy Bodurka, Ph.D. Laureate Institute for Brain Research
- Masaya Misaki, Ph.D. Laureate Institute for Brain Research
- Jamie L. Rhudy, Ph.D. University of Tulsa
- Amanda Sheffield Morris, Ph.D. Oklahoma State University
- Michael M. Criss, Ph.D. Oklahoma State University
- Jennifer Silk, Ph.D. University of Pittsburgh

SCIENTIFIC BACKGROUND

Dr. Alvarez received his doctorate from Harvard in Human Development and Psychology in 2005. He received a predoctoral fellowship from the National Institute of Mental Health (NIMH) in 2004 to study the neural correlates of cued fear and contextual anxiety using positron emission tomography in the Mood and Anxiety Disorders Program at NIMH.

From 2005-2009, Dr. Alvarez completed a postdoctoral fellowship in affective neuroscience in the NIMH Mood and Anxiety Disorders Program. As a postdoctoral fellow, he developed expertise in psychophysiology and functional magnetic resonance imaging (fMRI), and the use of advanced imaging techniques to collect high-resolution fMRI data in studies of the psychological and neural processes involved in emotion.

In 2009, he joined the Laureate Institute for Brain Research (LIBR) in Tulsa, OK, as an Assistant Professor, and in 2012, also joined the Faculty of Community Medicine at The University of Tulsa as an Assistant Professor of Psychology. Dr. Alvarez has published influential papers on the neural circuits involved in contextual processing and the role of these circuits in fear acquisition, fear extinction, anxiety, and psychopathology. Currently, Dr. Alvarez is a co-investigator on an OCAST-funded brain imaging study aimed at understanding the role of close relationships in fostering resilience in adolescent girls. He is also a recipient of a NARSAD Young Investigator Award from the Brain & Behavior Research Foundation, and the Principal Investigator of a NARSAD grant-funded study aimed at determining the neurobiological basis of altered anxiety and pain responses in depression.

LAB MEMBERS

- Namik Kirlic, Ph.D. Candidate, University of Tulsa
- Diamond Urbano, Science Intern II

Dr. Alvarez’s research focuses on three main areas:

1. Understanding the neural systems that underlie fear and anxiety, and their role in the development and maintenance of mood and anxiety disorders.

2. Developing tools using virtual reality technology and neuroimaging to improve assessment of and interventions for depression and anxiety spectrum disorders.

3. Integrating developmental, social, and affective neuroscience approaches to understanding how brain dysfunction associated with social and emotional processing leads to psychiatric symptoms in adolescents.
In regards to the former, she has conducted research related to neuropsychological correlates of PTSD and has developed an emotional decision-making task (the Approach-Avoidance Conflict task) to better understand behavioral, physiological, and neural correlates of anxiety. In regards to the latter, she has been involved in research investigating behavioral and neural mechanisms of current pharmacologic and behavioral treatments for anxiety and PTSD, and the investigation of novel interventions aimed at enhancing prefrontal function (e.g., cognitive training).

Dr. Aupperle’s research focuses on using neurocognitive methods to enhance our understanding of anxiety and post-traumatic stress disorder (PTSD). She is particularly interested in:

1. The intersect between cognitive and emotional processing and how this may relate to the development and maintenance of anxiety and PTSD.

2. How knowledge from neuroscience research may be used to enhance treatment and prevention efforts for anxiety and PTSD.
Dr. Bodurka’s research focuses on three main areas:

1. Non-invasive, multimodal neuroimaging method development and applications for studying brain function including: advanced BOLD fMRI, real-time fMRI with neurofeedback, multimodal simultaneous electroencephalography (EEG) and fMRI brain imaging, real-time integration of fMRI and EEG data, simultaneous EEG and fMRI neurofeedback, high-resolution structural MRI and high spatial and temporal resolution fMRI.

2. Novel non-invasive brain neuromodulation and neuroenhancement approaches to better understand brain emotion regulation and social interactions in major depressive disorder (MDD) and post-traumatic stress disorder (PTSD).

3. Translational approaches to discover and research novel therapeutic strategies to improve treatments by training and recovering healthy function of brain networks in MDD and PTSD.

Dr. Bodurka’s research interests in BOLD fMRI contrast mechanisms and the spatial and temporal fMRI limits resulted in advances in fMRI receiver and coil technologies. In 2007, for his development of a Scalable Multi-Channel MRI Data Acquisition System, he received NIH’s Director Award for Advancements in MRI Parallel Imaging Technology. The advancements in MRI receiver and RF multi-element coils technologies allowed for major improvements in MRI signal-to-noise ratio and pushed spatial and temporal limits for both functional and anatomical imaging. He has also developed an advanced real-time software set-up allowing for conducting real-time fMRI with neurofeedback. In 2009, Dr. Bodurka joined the newly established Laureate Institute for Brain Research (LIBR) to create a state-of-the-art MRI/fMRI/EEG facility and to establish a neuroimaging program.

Dr. Bodurka has broad expertise in Nuclear Magnetic Resonance and Magnetic Resonance Imaging physics. He received his doctorate degree in physics from the University of Nicolaus Copernicus in Torun, Poland, and completed part of his postdoctoral training in Nuclear Magnetic Resonance at the Department of Chemistry at Free University of Berlin, Germany. As a postdoctoral fellow at Medical College of Wisconsin, he received firm training in MRI technology and Blood Oxygenation Level Dependent (BOLD) functional MRI (fMRI). As Staff Scientist at the functional MRI Facility of the National Institute for Mental Health (NIMH) and the National Institute of Neurological Disorders and Stroke (NINDS), National Institutes of Health (NIH), he was responsible for providing a state-of-the-art imaging environment for conducting advanced fMRI and fMRI research.

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LAB MEMBERS

Qingfei Luo
Staff Scientist

Hiden Suzuki
Post-Doctoral Associate

Ahmad Maleki
Graduate Student, University of Oklahoma

Chung Ki Wong
Post-Doctoral Associate

Masaya Misaki
Staff Scientist

Kymberly Young
Post-Doctoral Associate

Raquel Philips
Research Specialist I

Han Yuan
Staff Scientist

SCIENTIFIC BACKGROUND

Dr. Bodurka has broad expertise in Nuclear Magnetic Resonance and Magnetic Resonance Imaging physics. He received his doctorate degree in physics from the University of Nicolaus Copernicus in Torun, Poland, and completed part of his postdoctoral training in Nuclear Magnetic Resonance at the Department of Chemistry at Free University of Berlin, Germany. As a postdoctoral fellow at Medical College of Wisconsin, he received firm training in MRI technology and Blood Oxygenation Level Dependent (BOLD) functional MRI (fMRI). As Staff Scientist at the functional MRI Facility of the National Institute for Mental Health (NIMH) and the National Institute of Neurological Disorders and Stroke (NINDS), National Institutes of Health (NIH), he was responsible for providing a state-of-the-art imaging environment for conducting advanced fMRI and fMRI research.

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RESEARCH COLLABORATORS

Hazen Rehe
University of Oklahoma, Tulsa

Peter Bandettini
NH/NIH, Bethesda, MD

John Dyer
University of Oklahoma, Norman

Scott Heiss
GE Healthcare, Milwaukee, WI

Patrick Leidien
Nova Medical Inc., Wilmington, MA

Frank Krasner
George Mason University

SELECTED PUBLICATIONS


Dr. Bodurka’s research focuses on three main areas:

1. Non-invasive, multimodal neuroimaging method development and applications for studying brain function including: advanced BOLD fMRI, real-time fMRI with neurofeedback, multimodal simultaneous electroencephalography (EEG) and fMRI brain imaging, real-time integration of fMRI and EEG data, simultaneous EEG and fMRI neurofeedback, high-resolution structural MRI and high spatial and temporal resolution fMRI.

2. Novel non-invasive brain neuromodulation and neuroenhancement approaches to better understand brain emotion regulation and social interactions in major depressive disorder (MDD) and post-traumatic stress disorder (PTSD).

3. Translational approaches to discover and research novel therapeutic strategies to improve treatments by training and recovering healthy function of brain networks in MDD and PTSD.
Our laboratory is interested in understanding the intimate connection between the body and the brain, and developing new technologies to help bring this connection to the forefront of awareness.

Every moment of the day, the brain is continuously infused with signals from the internal world of the body, especially the heart, lungs, gut, and immune system. The brain attempts to organize all of these signals into detailed body maps, essentially providing the brain with a snapshot of how the body is feeling, moment by moment.

It has recently been discovered that disturbances in these body maps form the foundation for a number of psychiatric conditions, including anxiety, addiction, and anorexia. Our laboratory aims to correct these disturbances by experientially teaching patients how to consciously access their brain’s body maps.

Since much of the processing that occurs inside these body maps is happening unconsciously, we are exploring several new approaches that can selectively enhance “interoceptive awareness.” One approach involves specialized flotation tanks, which are highly effective at removing the distractions from the external world so that patients can more clearly experience their internal world. Another approach involves real-time neurofeedback using fMRI and EEG, providing patients with the ability to literally view the brain activity inside their own body maps. Over time, and with repeated practice, these approaches offer patients the unique opportunity to reshape their internal experience.
Early work on biological abnormalities associated with depression has illustrated some likely bio-chemical and neural underpinnings of this disorder. This early work has taken a “one-variable-at-a-time” approach that has, unfortunately, failed to detect depression as well as psychiatric interviews. This approach has also done little to help us understand the marked variation across different cases of depression. Therefore, we have begun to embrace more sophisticated, multi-variable approaches to understanding depression in clinically meaningful ways. In the Systems Neuroscience and Psychopathology Laboratory, we strive to incorporate in our research the lessons from early work on the biology of mood disorders.

Active Programs of Research in Our Lab Include:

1. Identifying regularities in the corpus of research on the neural bases of depression. These meta-analytic syntheses of earlier empirical work provide a sparse map for guiding more integrative biological investigations.

2. Investigating neural-molecular interactions in depression. By conducting PET-based dopamine imaging in tandem with task-based fMRI, we are testing and developing models connecting abnormalities in dopaminergic tone with functional neural abnormalities in depression.

3. Examining gut-brain interactions in major depression. We are presently investigating how abnormalities in neurotransmitter producing gut flora relate to neural functional abnormalities in depression.

4. Connecting markers of peripheral inflammatory response with neural inflammation in depression.

Dr. Paul Hamilton did his undergraduate work at the University of California, Berkeley prior to receiving his Ph.D. from the University of Michigan. Dr. Hamilton joined the Laureate Institute for Brain Research in February 2013, following a postdoctoral fellowship in the Mood and Anxiety Disorders Laboratory at Stanford University.

Lab Members

Maurizio Bergamin, Ph.D.
Post-Doctoral Associate

David Chau, Ph.D.
Post-Doctoral Associate

Madison Farmer
Science Intern II

Ashley Reed
Graduate Student, University of Tulsa
Dr. Paulus’ research focuses on three main areas:

1. Understanding the neurobiology of anxiety disorders and addictive disorders using decision-making and interoception with brain imaging technology.

2. Developing tools using neuroscience to make clinically useful predictions for mood, anxiety, and addictive disorders.

3. Integrating subjective measurements with neurobiological approaches to understand how psychiatric symptoms emerge from brain dysfunction.

SCIENTIFIC BACKGROUND

Dr. Paulus studied Medicine at the Johannes Gutenberg University in Mainz from 1979-1985. He received a postdoctoral fellowship from the Deutsche Forschungsgemeinschaft (German Research Foundation) in 1986 to study the effects of calcium antagonists on animal models of mania at the University of California San Diego (UCSD). In 1993, Dr. Paulus left UCSD to resume his medical training and completed his internship at the Long Island Jewish Medical Center/Zucker Hillside Hospital on Long Island, NY. In 1994, he rejoined the Department of Psychiatry at UCSD as a psychiatric resident.

Dr. Paulus completed his residency in psychiatry at UCSD in 1997. At that time, he joined the Department of Psychiatry at UCSD as an Assistant Professor. He also became a staff psychiatrist at the Veterans Affairs San Diego Health Care System (VASDHS). Dr. Paulus is currently a Professor in the Department of Psychiatry at UCSD and Director of Telemental Health at the VASDHS, which focuses on delivering evidence-based psychotherapy to Operation Enduring Freedom and Operation Iraqi Freedom Veterans with Post-Traumatic Stress Disorder. In May 2014, Dr. Paulus joined the Laureate Institute For Brain Research (LIBR) in Tulsa, OK, as the Scientific Director and President.

Dr. Paulus has published over 250 scientific papers, has been funded continuously by federal grants since 1997, and is currently the Principal Investigator on a NIMH R01 aimed at determining the biological basis for positive and negative valence domains in anxiety and depression. He has served on numerous research panels, study sections, and advisory committees. Currently, Dr. Paulus is initiating a large-scale study in Tulsa, termed the T-1000, to determine whether biological measures can be developed to help a clinician predict patient outcomes.

RESEARCH COLLABORATORS

Marc Wittmann
Institut für Grenzgebiete der Psychologie und Physiologie

Guilia Gall
University of Chicago

Tony Yang
University of California, San Francisco

Lawrence Frank
University of California, San Diego

Alan N Simmons
University of California, San Diego

Wesley R Thompson
University of California, San Diego

Auditcha Swan
Singapore Institute for Clinical Science

Michelle Crooke
University of California, Los Angeles

Gregory Brown
University of California, San Diego

SELECTED PUBLICATIONS


Understanding the neurobiology of anxiety disorders and addictive disorders using decision-making and interoception with brain imaging technology.
SCIENTIFIC BACKGROUND

Dr. Savitz received an undergraduate degree (B.S.) at the University of the Witwatersrand in Johannesburg in psychology and genetics, performed further graduate work in neuropsychology, including a clinical internship, and then completed a Ph.D. on the genetics of bipolar disorder at the University of Cape Town. He subsequently completed a post-doctoral fellowship in the Section of Neuroimaging of Mood and Anxiety Disorders within NIMH’s Mood and Anxiety Disorders Program and is currently an assistant professor at the Laureate Institute for Brain Research and The University of Tulsa. Dr. Savitz is currently the PI on several grants, including a K01 grant from the NIMH. He has trained with two of the most well-known experts in their respective fields: Wayne Drevets, M.D. (mood disorders, neuroimaging) and Robert Dantzer, Ph.D. (psychoneuroimmunology), and has conducted a number of innovative studies that have addressed important gaps in our knowledge regarding the relationship between genes, immunological function and neuroimaging abnormalities in mood disorders.

Dr. Savitz’s research has two main foci. Firstly, characterizing the underlying neurological abnormalities associated with major depressive disorder and bipolar disorder, and linking these molecular changes to brain structure and function. In particular, Dr. Savitz’s research focuses on the tryptophan-kynurenine pathway, which is activated by inflammatory signals and produces neuroactive metabolites that may affect glutamategic signaling and adaptive immune function. The second arm of Dr. Savitz's program of research is to determine the influence of depression on the exacerbation and remission of medical conditions. Specifically, this program of research will examine how depression affects the development of vaccine-related immunity, inflammatory responses to external agents and the effect of depression on major medical conditions. In particular, this program of research focuses on the modulation of specific biochemical pathways as a consequence of depression. Understanding these relationships will have major implications on how to develop interventions that are aimed at improving medical outcomes.

LAB MEMBERS

Bart Ford  
Research Assistant

Harvey Morris  
Research Specialist

SELECTED PUBLICATIONS


RESEARCH COLLABORATORS

Jerzy Bodurka, Ph.D.  
Laureate Institute for Brain Research

Bart Frank, Ph.D.  
Oklahoma Medical Research Foundation

Hemmo Drexhage, M.D.  
Erasmus University

Wayne Drevets, M.D.  
Janssen Pharmaceuticals, Inc.

Sheldon Prekorn, M.D.  
Laureate Institute for Brain Research

Judith James, M.D.  
Oklahoma Medical Research Foundation

David Goldiner, M.D.  
NHI, NIMH

Brett McKinney, Ph.D.  
University of Tulsa

Brett Warheit, M.D, Ph.D.  
Laureate Institute for Brain Research

Kent Teague, Ph.D.  
University of Oklahoma, Tulsa

Frances McMahons, M.D.  
NHI, NIMH

Robert Dantzer, Ph.D.  
MD Anderson

Funding from: Janssen Pharmaceuticals, Inc., NIH, NIMH, NIAAA, MD Anderson

JONATHAN SAVITZ, PH.D.
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Dr. Savitz’s research is focused on identifying molecular mechanisms—in particular genetic and immunological factors—underpinning the neurophysiological abnormalities associated with mood disorders. To this end, he and his collaborators combine functional and high-resolution morphometric MRI techniques, genetics, and immunological assays in studies of patients with bipolar disorder and major depressive disorder.

Dr. Savitz graduated with a Ph.D in Human Genetics from the University of Cape Town in 2006 and subsequently completed post-doctoral training in neuroimaging under Wayne Drevets at the NIMH. Jonathan is currently an assistant professor at the Laureate Institute of Brain Research and the Faculty of Community Medicine at the University of Tulsa, OK.
Both domains of research are highly related, as the insula plays an important role in food motivation and gustatory representation, and interoception is an important component in satiety signaling. The common goal of these two lines of research is to elucidate how the body’s homeostatic state influences food reward representation and food-related decision making, both normatively and in psychiatric illness.

Dr. Simmons’ research falls generally within two domains. One is the neural basis of the conceptual representations underlying humans’ food knowledge. In a second domain of research, Dr. Simmons’ lab is examining the functional organization of the insular cortex, with particular attention to the insula’s role in monitoring of the physiological state of the body, otherwise known as interoception.

Dr. Simmons completed his Master’s degree in Clinical Psychology (2001) and his Ph.D. (2005) in Cognitive Psychology at Emory University. He then completed his postdoctoral fellowship under the direction of Dr. Alex Martin in the Laboratory of Brain and Cognition, within the National Institute of Mental Health intramural research program (2005 – 2009).

In 2009, Dr. Simmons moved to Tulsa, Oklahoma where he now directs the Appetitive and Interoceptive Psychopathology Lab at the Laureate Institute for Brain Research.
Ongoing Studies

If you are interested in participating in any of the studies below, or would like to be considered for future studies, please call our Assessment Team at 918-502-5100 or email info@laureateinstitute.org.

The Laureate Institute for Brain Research

VOLUNTEERS NEEDED

EARLY ONSET SCHIZOPHRENIA

If you are between the ages of 18-40 and have been diagnosed with schizophrenia or schizoaffective disorder, you may qualify for any of our studies. Please call: 918-502-5100 or email info@laureateinstitute.org.

VISTA STUDY: Valacyclovir in early Schizophrenia

Treatment, an Adjunct Therapy

Laureate Institute for Brain Research

6555 South Yale Ave, Tulsa, OK 74136

Are You Depressed?
Help us understand how the brain functions in individuals with Major Depressive Disorder (MDD)

ABOUT OUR RESEARCH

The Laureate Institute for Brain Research (LIBR) is studying the biological basis of Major Depressive Disorder (MDD). We conduct research using magnetic resonance imaging (MRI) to make images of the brain.

WE NEED YOU

You’re eligible if you:
• Are ages 18-40
• Currently taking antidepressants
• Are currently taking either medications

Joining the research study provides you with an opportunity to contribute to our understanding of MDD, which affects millions of Americans.

Compensation is provided.

SYMPTOMS OF MDD MAY INCLUDE:
• Fatigue
• Hopelessness
• Depressed mood
• Proprietary sleeping
• Difficulty concentrating
• Lack of motivation

For more information, please call LIBR at: 918-502-5100

Laureate Institute for Brain Research

6555 South Yale Ave - Tulsa, OK 74136

Visit us online at www.laureateinstitute.org or email info@laureateinstitute.org.

NOT ALL COMBAT WOUNDS ARE VISIBLE

ABOUT OUR RESEARCH

The Laureate Institute for Brain Research (LIBR) is currently enrolling participants in a study to examine the biological basis for PTSD.

WE NEED YOU

You are eligible if you:
• Are age 18- to 65
• Have a combat-related injury
• Have been diagnosed with PTSD

Joining the research study provides you with an opportunity to contribute to our understanding of PTSD, which affects millions of veterans.

Compensation is provided.

For more information, please call LIBR at: 918-502-5100

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Visit us online at www.laureateinstitute.org or email info@laureateinstitute.org.

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The Laureate Institute for Brain Research

VOLUNTEER for the TULSA 1000 STUDY

Let’s bring mental health into the 21st century for Oklahoma. Help us develop the world’s first “EGG” for the psychiatrist.

ABOUT OUR RESEARCH

LIBR is a scientific research institute focused on advancing breakthrough innovations to improve mental health.

PARTICIPATION

The Tulsa 1000 study is recruiting for a 2-year period to include adults with a history of mental health conditions.

WE NEED YOU

Qualified volunteers will:
• Be selected based on research
• Have at least one mental health condition
• Complete a comprehensive battery of assessments

You will be paid for your time spent participating in the Tulsa 1000 Study.

For more information, please call LIBR at: 918-502-5100

Laureate Institute for Brain Research

6555 South Yale Ave - Tulsa, OK 74136

Visit us online at www.laureateinstitute.org or email info@laureateinstitute.org.

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The Laureate Institute for Brain Research

RESEARCH PARTICIPANTS NEEDED in a Brain Imaging Study of Smoking

The Laureate Institute for Brain Research (LIBR) is currently enrolling adult smokers to better understand how smoking affects brain function. LIBR uses MRI, a noninvasive technique that uses no medication or radiation.

Participant Requirements:
• No psychiatric medications
• No illegal drug use
• No serious medical conditions
• No history of head trauma

Compensation is provided for time and effort related to participation.

For more information please contact:

Casey Myrle
(918) 502-5133
cmyrle@laureateinstitute.org

Laureate Institute for Brain Research

6555 South Yale Ave - Tulsa, OK 74136

Visit us online at www.laureateinstitute.org or email info@laureateinstitute.org.

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The Laureate Institute for Brain Research

Healthy Men Needed
Help us understand how the brain is affected by the body’s response to stress.

ABOUT OUR RESEARCH

The Laureate Institute for Brain Research (LIBR) is currently enrolling healthy men to examine the stress response system.

WE NEED YOU

You are eligible if you:
• Are age 18-45
• Have no mental or physical health conditions

For more information, please call LIBR at: 918-502-5100

Compensation is provided.

Laureate Institute for Brain Research

6555 South Yale Ave - Tulsa, OK 74136

Visit us online at www.laureateinstitute.org or email info@laureateinstitute.org.
Select Publications


