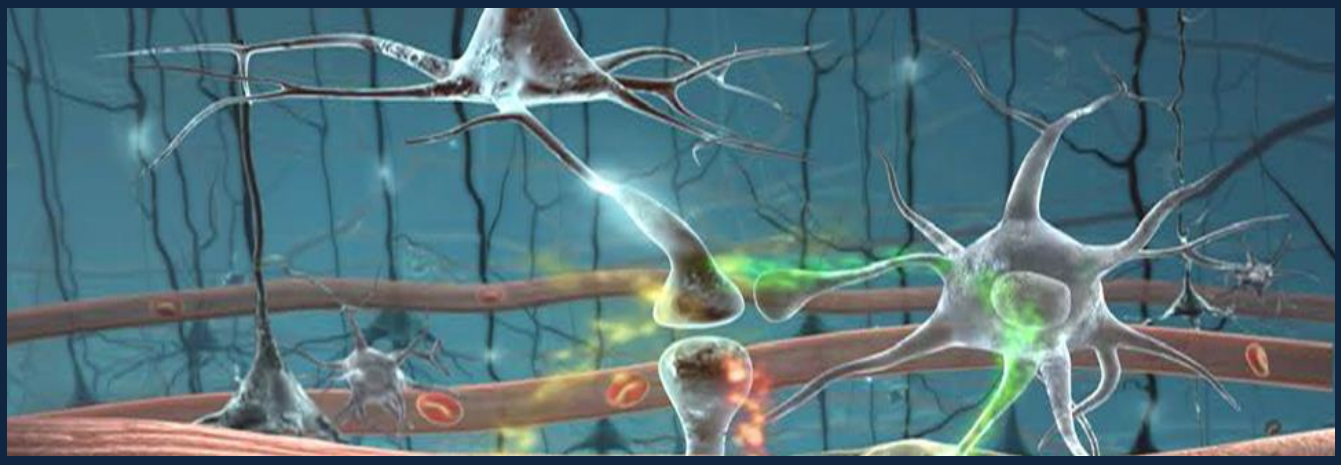
ENDURE

NIH Blueprint for Neuroscience Research



6th Annual Enhancing Neuroscience Diversity through Undergraduate Research Education Experiences (ENDURE) Meeting

November 12, 2016
San Diego, CA

The NIH Office of the Director and these NIH Institutes and Centers participate in the NIH Blueprint for Neuroscience Research:

- NCATS
- NCCAM
- NEI
- NIA
- NIAAA
- NIBIB
- NICHD
- NIDA
- NIDCD
- NIDCR
- NIEHS
- NIGMS
- NIMH
- NINDS
- NINR
- OBSSR

NIH Blueprint for Neuroscience Research

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ENDURE PROGRAM GOALS

The Blueprint initiative "Enhancing Neuroscience Diversity through Undergraduate Research Education Experiences (ENDURE)" aims to raise interest and opportunities in neuroscience research for individuals who are typically underrepresented in the neurosciences. The goal is to provide such individuals with training at the undergraduate level, so that they are prepared to enter and successfully complete neuroscience Ph.D. programs. ENDURE provides undergraduate training through partnerships between research-intensive institutions and institutions with a substantial enrollment of neuroscience majors from diverse groups. This includes individuals from underrepresented racial and ethnic groups; individuals with disabilities; and individuals from economically disadvantaged backgrounds. ENDURE undergraduate training programs support a range of activities to increase student interest and involvement in the neurosciences, including research experiences, core and advanced neuroscience courses, seminars, and journal clubs. In FY 10, five ENDURE awards were granted. In FY 15, six ENDURE awards were granted.

MEETING GOALS

As issued, the RFA (RFA-NS-14-010) cites "it is a goal of this initiative that the NIH Blueprint Institutes will convene an annual meeting that will bring together BP-ENDURE program directors and participating students." The purpose of the meeting will be to discuss best practices and provide a forum for student scientific and academic enhancing activities. An additional goal and outcome for this annual meeting is to provide linkage and opportunity for collaboration with existing diversity (example Neuroscience Scholars Program) and undergraduate (example Faculty for Undergraduate Neuroscience) programs already at Society for Neuroscience. The students will enhance their networks with other ENDURE participants, peer mentoring from diverse graduate students, and T32 program directors.

THE ORGANIZING COMMITTEE

Dr. Michelle Jones-London (NIH/NINDS)

Dr. Edgardo Falcon-Morales (NIH/NINDS)

Karen Gibson-Serrette (Longevity Consulting)

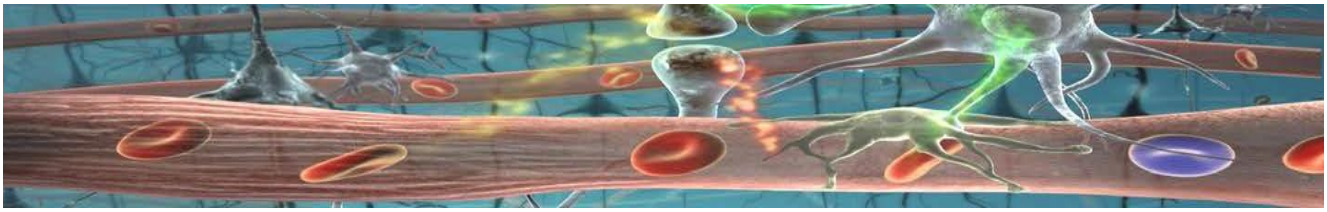
Dr. Mark Chavez (NIH/NIMH)

Dr. Lauren Ullrich (NIH/NINDS)

For further information about the program and its training sites:
http://neuroscienceblueprint.nih.gov/bp_nih-supported_training/endure_programs.htm

ENDURE trainees and Alumni

Visit and Like the ENDURE Facebook Page: An ENDUREing Network
www.facebook.com/BP.ENDURE



Enhancing Neuroscience Diversity through Undergraduate Research Education Experiences (ENDURE) 6th Annual Meeting

Manchester Grand Hyatt San Diego
Harbor Ballroom ABC
November 12, 2016

7:00 – 7:30 am Registration

7:30 – 7:40 am ENDURE Meeting Goals and Introduction

Dr. Michelle Jones-London, Director of Diversity Training and Workforce Development, National Institute for Neurological Disorders and Stroke (NINDS)

7:40 – 8:10 am NIH Blueprint Welcome and Scientific Presentation

Dr. Nora Volkow, Institute Director, National Institute on Drug Abuse (NIDA)
Q&A

8:10 – 9:45 am Panel on "Pathways and Perspectives on Being a Researcher"

Chair and Panel Introductions: *Dr. Nancy Desmond*, Director, Office of Research Training and Career Development, National Institute of Mental Health (NIMH)

A discussion framed by several specific questions: What a graduate student should expect both of the school and themselves? How to identify a good mentor? Why a career in neuroscience research is fulfilling? How do I prepare for and navigate some of the challenges of graduate school?

Each accomplished researcher will share their research background and answer the general questions from their respective lens including early lessons from graduate school, being a diverse scientist, and the big picture view of a research career

- Ms. Mariel Ríos – Ph.D. Candidate, UCLA, Interdisciplinary Program in Neuroscience (ENDURE Alumna – NYU/Hunter College)
- Dr. Joaquin Lugo – Associate Professor, Baylor University, Department of Psychology and Neuroscience
- Dr. Erich Jarvis – Professor, Rockefeller University; Howard Hughes Medical Institute

9:45 – 11:30 am Concurrent Networking Sessions

(A) T32 Recruitment Fair and Networking – Institutions with a strong record of neuroscience training and interested in recruiting for predoctoral research programs

(B) ENDURE Alumni Networking Room - A presentation of NIH funding opportunities followed by round table discussions of various research and professional development topics

Presenters: Dr. Albert Avila, (NIDA) and Dr. Stephen Korn, (NINDS)
Round Table Experts: Ms. Lynn Morin (NIAAA), Dr. Richard Baird (NIBIB), Dr. Michael Sesma (NIGMS), Dr. Chyren Hunter (NIA), and Dr. Nancy Desmond (NIMH)

BIOGRAPHICAL SKETCHES

Nora D. Volkow, PhD

Director, National Institute on Drug Abuse
National Institutes of Health

Nora D. Volkow, M.D., became Director of the National Institute on Drug Abuse (NIDA) at the National Institutes of Health in May 2003. NIDA supports most of the world's research on the health aspects of drug abuse and addiction.

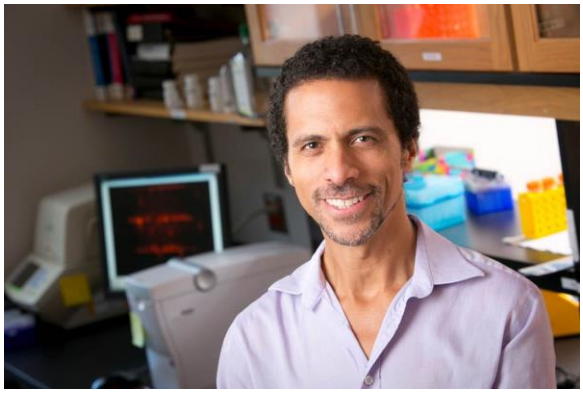
Dr. Volkow's work has been instrumental in demonstrating that drug addiction is a disease of the human brain. As a research psychiatrist and scientist, Dr. Volkow pioneered the use of brain imaging to investigate the toxic effects and addictive properties of abusable drugs. Her studies have documented changes in the dopamine system affecting, among others, the functions of frontal brain regions involved with motivation, drive, and pleasure in addiction. She has also made important contributions to the neurobiology of obesity, ADHD, and aging.
Dr. Volkow was born in Mexico, attended the Modern American School, and earned her medical degree from the National University of Mexico in Mexico City, where she received the *Robins* award for best medical student of her generation. Her psychiatric residency was at New York University, where she earned the *Laughlin Fellowship Award* as one of the 10 Outstanding Psychiatric Residents in the USA.

Dr. Volkow spent most of her professional career at the Department of Energy's Brookhaven National Laboratory (BNL) in Upton, New York, where she held several leadership positions including Director of Nuclear Medicine, Chairman of the Medical Department, and Associate Director for Life Sciences. In addition, Dr. Volkow was a Professor in the Department of Psychiatry and Associate Dean of the Medical School at the State University of New York (SUNY)-Stony Brook.
Dr. Volkow has published more than 600 peer-reviewed articles and written more than 95 book chapters and non-peer-reviewed manuscripts, and has also edited three books on neuroimaging for mental and addictive disorders.

During her professional career, Dr. Volkow has been the recipient of multiple awards. In 2013, she was a Samuel J. Heyman Service to America Medal (Sammies) finalist; and she was inducted into the Children and Adults with Attention-Deficit/Hyperactivity Disorder (CHADD) Hall of Fame. She was elected to membership in the Institute of Medicine in the National Academy of Sciences and received the International Prize from the French Institute of Health and Medical Research for her pioneering work in brain imaging and addiction science. She has been named one of *Time* magazine's "Top 100 People Who Shape Our World," "One of the 20 People to Watch" by *Newsweek* magazine, *Washingtonian magazine's* "100 Most Powerful Women" and "Innovator of the Year" by *U.S. News & World Report*. Dr. Volkow was the subject of a 2012 profile piece by CBS's 60 Minutes and was a featured speaker at TEDMED 2014.

PANEL SPEAKERS

Each accomplished researcher will share their research background and answer general questions from their respective lens including early lessons from graduate school, being a diverse scientist, and the big picture view of a research career.



Erich Jarvis, Ph.D.

Professor, Rockefeller University

Days before graduating from the High School of Performing Arts in New York City, Erich Jarvis was invited to audition for the Alvin Ailey American Dance Theater, a renowned African American modern dance company. Instead, he chose pipettes over pirouettes: "I also really loved science, and I thought I could have a bigger impact doing that."

He may well have been right. As a neurobiologist, now at Duke University, Jarvis has had a productive career studying molecular pathways in the brains of songbirds—his chosen window into the larger issues of how the brain controls complex behavior. Along the way, he has proposed bold theories about the evolution of vocal production and learning in birds and how it relates to the origins of human language. Against considerable resistance, Jarvis successfully lobbied for and helped organize a series of scientific meetings in which researchers made major revisions in the terminology used to describe avian brain organization relative to other vertebrates because he believed the old naming system was outdated and impeding progress in the field.

Jarvis grew up in difficult surroundings in Harlem. His family was poor to middle class and his parents were divorced, so he and his siblings were shuttled among various relatives. His father, a science and music enthusiast from whom Jarvis says he learned intellectual openness and creative thinking, suffered from mental illness that culminated in drug addiction, homelessness and, in 1988, his death in an apparently random murder.

Jarvis overcame these hardships and made the sometimes-rocky transition to the demanding world of top-drawer science. After graduation from Hunter College in New York City with a bachelor's degree—and six papers on bacterial molecular genetics in Rivka Rudner's lab—he did graduate and postdoctoral work in the Rockefeller University lab of Fernando Nottebohm, who pioneered research on the neurobiology of song-learning in birds as a model for understanding neural plasticity in the adult brain.

At Rockefeller, Jarvis devised a method he termed "behavioral molecular mapping" to determine how a bird's motor activities influence the resulting changes in gene expression in the brain. With this tool he has traced out the brain pathways for vocal learning in three distantly related birds—parrots, hummingbirds, and songbirds. Surprisingly, he found the pathways were strikingly alike. He concluded that vocal-learning mechanisms had evolved in three separate and independent events that must have been guided by strong genetic influences.

In fact, Jarvis and his colleagues suggest that human language ability is the result of a similar evolutionary journey. What birds and humans have in common, he notes, is a connection between the front part of the brain and nerves in the brainstem that control movement—namely, muscles for producing songs in birds and speech in humans.

Jarvis's lab is now trying to identify the evolutionary factors that permitted birds and humans to learn a variety of vocalizations. "My hypothesis is that it was for attracting mates," Jarvis says. "The more varied the sound an animal produces, the more likely it will attract the opposite sex."
Using his molecular mapping technique, Jarvis recently discovered that the brain centers for vocal learning in birds appear to have evolved from an ancient pathway involved in motor control. The design of the vocal-

learning pathways may have followed this preexisting anatomical pathway, used to control the limbs for movement. In Jarvis's opinion, this means that learned singing is a highly specialized form of motor control, rather than a sign of high intelligence. Jarvis also recently co-led an international consortium to sequence the genomes of many species across all bird orders and used it to resolve the bird family tree, origins of vocal learning in birds, and convergent molecular changes in genes regulated in song learning brain areas of birds and speech brain areas of humans. The identified genes are candidates that develop and control vocal learning brain circuits in birds and humans.

As the recipient of the 2015 Ernest Everett Just Award from the American Society for Cell Biology, Dr, Jarvis wrote an essay about his path as an underrepresented minority scientist.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4626054/pdf/3692.pdf

Joaquin N. Lugo, Ph.D.
Associate Professor
Department of Psychology and Neuroscience
Baylor University

Dr. Joaquin Lugo is an Associate Professor of Neuroscience and Psychology at Baylor University. One of his research interests is to determine the role of the PI3/AKT/mTOR pathway as a potential molecular mechanism underlying social deficits, other autistic-like behaviors, and cognitive deficits associated with early-life seizures. To address this question he is investigating whether seizures at different periods of development lead to cognitive and social behavioral deficits and to determine whether aberrant mTOR signaling plays a role. After receiving his bachelor's degree in neuroscience from Baylor University, he went on to study Fetal Alcohol Syndrome and earned his doctorate from the University of South Carolina-Columbia in 2004. Dr. Lugo further developed his interest in developmental neuroscience by pursuing a postdoctoral fellowship at Baylor College of Medicine. During his time as a postdoc he investigated the effects of acute seizures on changes in intrinsic excitability of hippocampal neurons. In particular, he investigated how seizures alter protein expression levels and phosphorylation state of the A-type K+ channel Kv4.2.

In addition to his research interests in epilepsy, Dr. Lugo has expanded his lab's effort to include examination of Fragile X Syndrome and the role of environmental toxins on brain development. He has also been involved in several education outreach efforts at local schools. He is currently the faculty advisor for the Nu Rho Psi neuroscience honor's society and for the Baylor Neuroscience Society.

Mariel Ríos
Graduate Student
University of California-Los Angeles

Mariel Ríos is graduate student at University of California - Los Angeles where she is pursuing a PhD in neuroscience. Mariel received her Bachelor of Science in Neural Science from New York University where she studied an animal model of Anorexia Nervosa. Before applying to graduate school, she worked for two years as a research assistant at The Rockefeller University studying animal models of stress. At UCLA, Mariel decided to begin utilizing magnetic resonance imaging and has joined two labs: the labs of Dr. Susan Bookheimer and Dr. Carrie Bearden. Her work focuses on the mechanisms behind the emergence of psychiatric disorders during adolescence, particularly the role of prefrontal cortex connectivity. Mariel will be analyzing intermediate phenotypes in a diverse, adolescent population sample to elucidate how genetic risk and developmental trajectory work together to contribute to psychopathology.

T32 RECRUITMENT FAIR PARTICIPANTS

University/School	Representative
BROWN UNIVERSITY	**Anne C. Hart, PhD** Professor of Biology **Diane Lipscombe, PhD** Professor of Neuroscience **David Sheinberg, PhD** Professor
COLUMBIA UNIVERSITY	**Aniruddha Das, PhD** Associate Professor of Neuroscience
GEORGETOWN UNIVERSITY	**G. William Rebeck, PhD** Professor **Patrick Forcelli, PhD** Instructor in Pharmacology **Ludise Malkova, PhD** Associate Professor **Edith Brignoni-Pérez** Graduate Student
HARVARD MEDICAL SCHOOL	**Rosalind Segal, MD, PhD** Professor of Neurobiology **Corey Harwell, PhD** Assistant Professor
MICHIGAN STATE UNIVERSITY	**Cheryl Sisk, PhD** University Distinguished Professor
NEW YORK UNIVERSITY	**Heather McKellar, PhD** Program Manager, Neuroscience Institute **Chiye Aoki, PhD** Professor of Neural Science and Biology **Robert Froemke, PhD** Assistant Professor
OHIO STATE UNIVERSITY COLLEGE OF MEDICINE	**Denis Guttridge, PhD** Professor Director, Center for Muscle Health and Neuromuscular Disorders
OREGON HEALTH & SCIENCE UNIVERSITY	**Gary Westbrook, MD** Senior Scientist and Co-Director, Vollum Institute Director, Neuroscience Graduate Program
PRINCETON UNIVERSITY	**Ken Norman, PhD** Professor of Psychology **Ed Clayton, PhD** Sr. Project Manager, Princeton Neuroscience Institute **Laura Bustamante** Graduate Student
STANFORD UNIVERSITY	**John Huguenard, PhD** Professor of Neurology and Neurological Sciences
TEMPLE UNIVERSITY	**Lisa Briand, PhD** Assistant Professor
UNIVERSITY OF CALIFORNIA BERKELEY	**Dan Feldman, PhD** Professor of Neurobiology
UNIVERSITY OF CALIFORNIA, DAVIS	**Cristeta Rillera** Neuroscience Graduate Program Coordinator Students Affair Officer
UNIVERSITY OF CALIFORNIA, SAN DIEGO	**Tim Gentner, PhD** Professor and Director of Neuroscience Graduate Program **Gentry Patrick, PhD** Associate Professor

	Brad Voytek, PhD Assistant Professor **Erin Gilbert** Program Coordinator
UNIVERSITY OF COLORADO DENVER	**Diego Restrepo, PhD** Professor, Cell and Developmental Biology Director, Center for NeuroScience (CNS) **Sondra Bland, PhD** Associate Professor **Ernesto Salcedo, PhD** Senior Instructor
UNIVERSITY OF IOWA	**C. Andrew Frank, PhD** Assistant Professor, Molecular and Cell Biology Admissions Chair, Interdisciplinary Neuroscience Graduate Program
UNIVERSITY OF MARYLAND	**Jessica A. Mong, PhD** Associate Professor Department of Pharmacology Director of Graduate Education, Program in Neuroscience
UNIVERSITY OF MICHIGAN	**Audrey Seasholtz, PhD** Professor, Biological Chemistry **Edward Stuenkel, PhD** Professor, Molecular & Integrative Physiology Director, Neuroscience Graduate Program
UNIVERSITY OF PENNSYLVANIA	**Kelly L. Jordan-Sciutto, PhD** Professor of Pathology **Christine Clay** Coordinator, Neuroscience Graduate Group
UNIVERSITY OF SOUTHERN CALIFORNIA	**Pat Levitt, PhD** Provost Professor and Director USC Neuroscience Graduate Program
UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER SAN ANTONIO	**Alan Frazer, PhD** Professor of Pharmacology and Psychiatry
UNIVERSITY OF UTAH	**Richard Dorsky, PhD** Professor of Neurobiology and Anatomy
UNIVERSITY OF WASHINGTON	**Jane Sullivan, PhD** Associate Professor, Physiology and Biophysics
VANDERBILT UNIVERSITY	**Danny G. Winder, PhD** Professor, Molecular Physiology and Biophysics; Psychiatry
WAKE FOREST UNIVERSITY	**Carol Milligan, PhD** Professor, Neurobiology and Anatomy
WASHINGTON UNIVERSITY IN ST. LOUIS	**Erik Herzog, PhD** Professor, Department of Biology
YALE UNIVERSITY	**Michael Crair, PhD** Professor and Director, Graduate Studies **Charles A. Greer, PhD** Professor and Director, Interdepartmental Neuroscience Graduate Program

T32 RECRUITMENT FAIR PARTICIPANTS

Brown University

Program Representative(s): Anne C. Hart, PhD; Diane Lipscombe, PhD; David Sheinberg, PhD

Our Interdisciplinary Predoctoral Neuroscience Training Program strives to provide individualized, high quality training to predoctoral students interested in pursuing scientific research careers in the biological and biomedical sciences. This training grant will support students in their first two years of graduate studies, before they start their dissertation research. Graduate students in our program receive broad, multi-disciplinary training that spans many levels of inquiry, from genes through cognition, and emphasizes concepts, methodologies, quantitative skills, and sophisticated analysis of the primary literature. Our core curriculum consists of team-taught graduate courses, seminars, and workshops that provide a strong scientific foundation in neuroscience and develop skills that are essential for successful, independent research careers in neuroscience, such as effective science writing and oral presentation, knowledge of scientific review processes, and training in ethics. We have introduced new initiatives to expose students to translational and clinical neuroscience with our Bench to Bedside seminar series. On average, students in our program finish their PhD in 5.35 years, and the majority of our alumni continue their careers in science-related fields including academic or industry science positions. We foster an environment unconstrained by traditional discipline boundaries and where graduate students are encouraged to work at the interfaces of these disciplines. The faculty trainers are drawn from seven different Brown University departments: Neuroscience; Cognitive, Linguistic, and Psychological Sciences; Molecular Biology, Cell Biology, and Biochemistry; Engineering; Molecular Pharmacology, Physiology and Biotechnology; Biostatistics; and Neurosurgery. They are a distinguished and energetic group of brain scientists that collectively cover the spectrum of modern neuroscience research: they work with a wide variety of model organisms, from worms to humans, and use an array of modern neuroscience techniques, including functional MRI, applications of robotics and neuroprosthetics, optogenetics, advanced in vivo and in vitro electrophysiological recordings, mouse transgenics, behavioral studies, molecular manipulations of neuronal genes, functional proteomics, and human genome-wide association studies. We encourage and facilitate collaborations between labs as well as research in computational and translational neuroscience that typically reside at the interface of disciplines. Key features of the Neuroscience Graduate Program at Brown include: Excellence in research along with excellence in education and mentorship; a history of interdisciplinary and translational research; rigorous training in experimental design and quantitative methods, and an environment of highly productive labs where graduate students are equal partners in the research process.

Columbia University

Program Representative(s): Aniruddha Das, PhD

Columbia University's-wide Doctoral Program in Neurobiology in Behavior (NB&B) was founded in 1995 by John Koester and Darcy Kelley. NB&B includes 50 neuroscience training faculty from 10 departments on both the Medical School and Arts and Sciences campuses that serve as Ph.D. mentors and/or participate actively in NB&B teaching and governance. Sixty-six additional faculty members serve as potential research rotation and dissertation sponsors. Students are admitted directly to the program by a fifteen-member Admissions Committee of training faculty. US students receive individual fellowship support from the NSF, DOD and NIH (pre-doctoral NRSAs). Non-US students receive external support from Fullbright, NSERC (Canada) and the HHMI. The training program opens with a "Boot Camp", a two-week introduction to current research approaches, followed by a neuroscience survey course and three advanced seminars. Research rotations, typically three, are taken in the first year. In addition, students complete three professional development courses led by the NB&B Program Co-directors: a first-semester course focused on developing a research fellowship proposal, a second-semester course on responsible conduct of science and a professional development course for advanced students. Students are directly supervised by the Co-directors in years one and two. By the beginning of the second year, students choose a thesis laboratory and take a qualifying examination to advance to candidacy by the beginning of year 3. The qualifying examination committee typically

constitutes the core of the thesis advisory committee that meets yearly with each student through year four and every 3 to 6 months prior to thesis defense, typically 5.5 - 6.5 years post-matriculation. All students attend the weekly NB&B research seminar, a student journal club and lab meetings. A NB&B Program-wide retreat is held biannually and students receive support to attend scientific meetings.

Georgetown University

Program Representative(s): Edith Brignoni-Pérez; Patrick Forcelli, PhD; Ludise Malkova, PhD; G. William Rebeck. PhD

The Interdisciplinary Program in Neurosciences (IPN) at Georgetown University is the largest biomedical Ph.D. granting program at Georgetown University. This broad-based, transdisciplinary, non-departmental program leads to a Ph.D. in Neuroscience. The IPN was established in 1994, and has been supported by NIH since 2000. The primary goal of this training program is to develop "Stewards of the Discipline" by training students in the scholarly pursuit of research in integrative neuroscience. Our students are trained in a multi-level approach: from genes to cells to behaving organisms. The 29 core training faculty and 17 supporting faculty in this program are drawn from 14 clinical and basic science departments on the Main Campus and Medical Center, which are combined at Georgetown University's campus in Washington, DC. These faculty span a breadth of inquiry, ranging from neurotransmitter receptors and signal transduction, to behavior and human disease. Particular areas of research strengths include 1) neural injury, degeneration, and plasticity; 2) synaptic modulation and signal transduction; 3) neural substrates of autism, epilepsy, dementias; and 4) telencephalic neural networks subserving sensory processing, memory and language. Students gain training in a range of approaches, including molecular, genetic, neurophysiological, cognitive testing, computational and imaging techniques. The program enrolls 40-50 thesis and prethesis students. Aggressive recruitment of underrepresented racial and ethnic applicants have been successful (over 20% of students), and continues to be a top priority. The training environment fosters interactive, transdisciplinary research of both faculty and trainees. The IPN faculty are highly collaborative; students are encouraged to seek co-mentorship between faculty with interfacing interests and complementary approaches. Core training faculty have research grant support and fully equipped facilities for training pre-and postdoctoral students. The training program includes broad-based didactic coursework, as well as rotations in laboratories of the training faculty. The trainees participate in a seminar series, national professional meetings, journal clubs, intensive laboratory research, and training in several essential professional skills (writing and reviewing manuscripts, grantsmanship, mentorship, teaching, conflict resolution, career choices, oral presentations) and their ethical dimensions. Students are also very active in governance of the IPN. Opportunities for gaining practical teaching experience at the undergraduate and secondary school levels are abundant and encouraged.

Harvard University School of Medicine

Program Representative(s): Corey Harwell, PhD; Rosalind A. Segal, MD, PhD

The Jointly Sponsored Predoctoral Training Program in Neurosciences is the major source of support for early year students in the Ph.D. Program in Neurosciences at Harvard University. The goals of this interdepartmental Ph.D. program, established in 1981, are (1) to organize within a single training faculty the neuroscientists at Harvard Medical School, its affiliated hospitals, and Harvard College; and (2) to train research scientists and teachers who are interested in mental health, diseases of the nervous system, and fundamental mechanisms of the brain. The program is designed to provide trainees with a broad and thorough background in neuroscience and to mentor them in performing original and rigorous research in important areas of neuroscience. In the first 18 months, trainees complete a sequence of core courses ranging from cell and molecular neurobiology to systems neuroscience, as well as collateral courses selected from cell and molecular biology, immunology, statistics, and other subjects appropriate to individual interests. Students rotate through three different laboratories. Following the coursework, laboratory rotations, and a preliminary examination, students begin full time dissertation research. They are also involved in other ongoing training activities including journal clubs, seminars, and data presentation. There are currently 100 graduate students enrolled in the Program in Neuroscience. The total faculty includes 118 members. Considerable effort

has gone into making this program a highly interactive group with extensive formal and informal contacts between students and faculty. Graduates of this program have a high rate of staying in careers in biomedical research and make substantial contributions to a growing understanding of neuroscience.

Michigan State University

Program Representative(s): Cheryl Sisk, PhD

The Neuroscience Program at Michigan State University (MSU) provides interdisciplinary graduate education and research training leading to the Ph.D. degree in neuroscience. The Program's mission is to prepare students for successful research careers in academia, government, or the private sector. The Training Program is predicated on the conviction that the best and most successful neuroscientists 1) have a strong foundation in the operation of the nervous system at all major levels of analysis, 2) are well-versed in scientific method and hypothesis testing, and 3) have acquired the professional skills that facilitate interdisciplinary research collaborations and the integration and dissemination of knowledge. To provide students with these essential tools, the Training Program includes a broad-based curriculum in the fundamentals of nervous system function and disease, specialized research training with faculty, and professional mentoring. The 35 training faculty come from a broad spectrum of departments; research opportunities for trainees range from the molecular basis of synapse formation to translational medicine to the evolution of nervous system structure and behavior. The faculty is committed to providing students with the research training and mentoring that enable them to identify important research problems and work collaboratively to solve them, and to developing the professional skills and behaviors that are necessary for successful research careers.

New York University

Program Representative(s): Heather McKellar, PhD; Robert Froemke, PhD; Chiye Aoki, PhD

This integrated, multidisciplinary, neuroscience training program at New York University, prepares trainees for the intensely collaborative and interdisciplinary nature of modern neuroscience research. Historically, two neuroscience graduate programs existed in parallel at NYU. However, with substantial support from the University over the past seven years, we have reached a new phase of program integration that seamlessly merges neuroscience graduate education at NYU and offers far greater breadth and depth of training than each program offered individually. Our program, which includes 81 training faculty, combines the strengths in systems, cognitive, and computational neuroscience from the Washington Square-based Center for Neural Science with those in cellular, molecular, developmental, translational, and clinical neuroscience at the NYU School of Medicine campus, and it serves as the foundation for the extensive neuroscience community at NYU. Our graduate program is highly competitive at the national level, proven by our success during the previous funding period in recruiting outstanding graduate students as well as a number of new junior and senior faculty. The specific goals of our neuroscience training program are: (1) To provide a rigorous, high-quality, and broad-based graduate education in neuroscience within the context of an interactive, collegial, and cutting-edge research environment; (2) To increase the number of high caliber students that apply to and participate in the program, including active recruitment of underrepresented minorities; (3) To provide students with guidance of a rigorous mentoring system that ushers students through a series of milestones to a doctoral degree typically in 5-6 years; (4) To train students in necessary professional skills, including critical reading, grant writing, oral presentation, leadership, management, and networking; (5) To encourage a broad perspective on the field of neuroscience that encompasses basic, translational, and clinical research; and (6) To prepare students for the variety of scientific career opportunities that will be available to them after graduate school. Through our newly integrated graduate program, we provide trainees with a vast and rich intellectual environment, as well as the resources and experience, to confidently pursue their own scientific interests and become independent scientific leaders, who will make future breakthroughs in basic, translational, and clinical neuroscience.

Ohio State University College of Medicine

Program Representative(s): Denis C. Guttridge, PhD

This pre- and postdoctoral training program is centered on neuromuscular biology and associated diseases including Duchenne muscular dystrophy, spinal muscular atrophy, and amyotrophic lateral sclerosis that together affect approximately 80,000 people in the United States. Although the neuromuscular field has made tremendous strides in better understanding the underlying mechanisms of these disorders, which in some cases have translated to new treatment options, greater research is needed to discover cures for these terminal diseases, since sadly currently none exist. Achieving this goal hinges on the quality of research laboratories and clinics worldwide, and importantly, on the success of training programs that will prepare the next generation of graduate students along with basic and clinical postdoctoral researchers to continue making fundamental strides in ascertaining the causes and cures of neuromuscular diseases. The laboratories of Ohio State University and Nationwide Children's Hospital consist of 16 mentors that have significant basic and translational expertise in neuromuscular research. This group of mentors and their laboratories are highly interactive, and working together has generated a research environment that is also highly conducive to the success of their predoctoral and postdoctoral trainees. With the commitments of our faculty and university, along with existing supporting training programs from the Wellstone Muscular Dystrophy Cooperative Research Center, our core 16 mentors have developed a more structured training plan. The training, specialized in neuromuscular diseases, contains three tracks, one for graduate students, a second for basic postdoctoral scientists, and a third for clinical postdoctoral scientists. Each will contain a unique training component that will ensure that predoctoral and postdoctoral fellows are well positioned to transition to the next phase of their careers, and importantly, are able to contribute to the future discoveries underlying the causes and cures of neuromuscular diseases.

Oregon Health and Sciences University

Program Representative(s): Gary L. Westbrook, MD

The OHSU community has one of the largest groups of neuroscience faculty in the United States with more than 150 faculty covering the full range of relevant scientific and clinical disciplines, and thus incoming PhD students have a wide array of choices as they embark on a scientific career. Although multidisciplinary at every level, neuroscience has been traditionally divided by the level of organization from molecules and cells on up to circuits and systems, and then to behavior and cognition. To cover this vast range, incoming PhD students at OHSU have access to two options for training, the interdepartmental Neuroscience Graduate Program (NGP), first developed in the Vollum Institute, and the Behavioral Neuroscience Program (BEHN) based in the Department of Behavioral Neuroscience in the OHSU School of Medicine. Students have access to the full range of courses in both NGP and BEHN and many faculty serve as mentors in both. Several opportunities for summer undergraduate to gain research experience are available. The Vollum Institute also offers a stipended summer undergraduate fellowship program that includes both coursework and internship in a neuroscience laboratory. OHSU also offers a summer equity program that also provides laboratory research experience. For more information, visit
http://www.ohsu.edu/xd/education/schools/school-of-medicine/education/neuroscience-graduate-training/index.cfm

Princeton University

Program Representative(s): Laura Bustamante; Ed Clayton, PhD; Ken Norman, PhD

Neuroscience research is becoming increasingly quantitative. Formal theoretical techniques are essential for understanding how complex, large-scale interactions between neurons give rise to thought and behavior, and advanced quantitative methods of data analysis are necessary for addressing the increasingly large, multidimensional data sets generated by modern brain imaging techniques (e.g., multiunit recording, fMRI). These methods are also necessary for future progress to be made in understanding, diagnosing, treating and, ultimately, curing brain disturbances that give rise to psychiatric disorders. Unfortunately, the mathematical and computational skills required to address

these needs are not a focus of standard neuroscience curricula. Princeton's Quantitative Neuroscience Training Program (QNTP) is designed to address this need, by providing the next generation of neuroscientists with the necessary mathematical and computational skills for measuring, analyzing, and modeling brain function. The establishment of the QNTP has sparked several developments at Princeton, that (in turn) have accelerated the pace at which the goals of the QNTP are being met. By bringing Princeton's neuroscientists together with faculty in Physics, Mathematics, Computer Science and Engineering, the QNTP helped to spur the formation of the Princeton Neuroscience Institute (PNI) in 2005. The QNTP also helped to inspire the formation (in 2008) of PNI's new free-standing PhD Program in Neuroscience, which incorporates a strong emphasis on classroom and laboratory training in basic quantitative and computational methods during its first two years. These new developments have made it possible for us to refocus the QNTP from its original purpose (providing a foundation in quantitative neuroscience for trainees who are starting out in this area) to providing advanced training in quantitative neuroscience. Specifically, we take the most quantitatively-focused subset of our predoctoral and postdoctoral trainees and provide them with the additional tools and training that they need to excel in computational neuroscience research. This training is accomplished via advanced quantitative and computational neuroscience elective courses that were developed for the QNTP and are taught by leaders in the field, as well as participation in research seminars, journal clubs, and retreats that are designed to deepen the trainees' knowledge and bolster community among the trainees. PNI faculty have made seminal contributions to quantitative neuroscience, ranging from information-theoretic analyses of neuronal spiking and nonlinear dynamical systems analysis of decision-making to multivariate decoding of human neuroimaging data. The QNTP has been specifically formulated to bring predoctoral and postdoctoral trainees into contact with this expertise and, through this, to catalyze their transformation into full-fledged computational neuroscientists.

Stanford University School of Medicine

Program Representative(s): John Huguenard, PhD

The goals of the Stanford Neurosciences Program are to train PhD students as leaders in neuroscience research and teaching. Our program continues to adapt to the ever changing state of the art of the science as well as preparation required for the various roles of our graduates. Teaching students how to identify, approach and solve specific research problems will promote their professional development as independent scientists and will contribute new knowledge to the fight against neurological and psychiatric disease. To this end the Program provides students with the opportunity to conduct cutting edge neurobiological research in any of a broad range of disciplines including molecular and cell biology, genetics, biophysics, electrophysiology, anatomy, computational modeling, neuroimaging, and the quantitative study of behavior. Formal course work requires students to examine how the nervous system functions at all levels, during development, and in normal and diseased states. It requires students to integrate this knowledge across levels and to apply it to their specific research goals. The Program incorporates added depth and breadth via a suite of activities including a laboratory boot camp, retreats, seminar series, summer courses, and networking opportunities. All students will be enrolled in the Interdepartmental Program in Neuroscience, the only academic body at Stanford that awards a PhD in the neurosciences. The training faculty is composed of 91 researchers from 22 Departments in 3 Schools. The faculty is highly interactive, intellectually diverse, and their research efforts well-funded. Their research covers nearly every aspect of neuroscience, with concentrations in cellular/molecular, computational, developmental, systems/cognitive/behavioral neuroscience, membrane excitability and neurobiology of disease. Trainees are required to rotate through three labs before committing to a preceptor. Course requirements must be fulfilled with courses taught by different academic departments, and the members of the examination and thesis committees must be from more than one department. The Program Committee, which is the governing body, is composed of Program faculty from eight departments, along with student representatives. Admissions and curriculum issues are handled by separate committees, each composed of similarly diverse faculty/student groups. Admitted students are among the most outstanding candidates in the nation. Past trainees of the Neurosciences Program have been extremely successful in pursuing academic research careers.

Temple University

Program Representative(s): Lisa Briand, PhD

The Drugs of Abuse Training Program at Temple University School of Medicine provides individualized multidisciplinary training to predoctoral students and postdoctoral fellows who are dedicated to researching the neurobiology of addiction, the pharmacological effects of drugs of abuse, and the effects of drugs of abuse on the immune system including HIV infection. It is a basic science training program that provides intensive immersion in state-of-the-art approaches and techniques to address important issues in the substance abuse field. This Training Program is supported by a team of exceedingly talented faculty who are committed to training the next generation of substance abuse researchers. The faculty mentors are highly collaborative, and the trainees benefit from a dynamic interactive atmosphere. Although the home of the Training Program is in the Department of Pharmacology, the faculty mentors come from many disciplines including neuroscience, microbiology and immunology, pathology, molecular biology, anatomy, cell biology, psychology, pharmaceutical sciences, and pharmacology, thus providing a multidisciplinary training environment. The faculty and trainees are brought together through the support of the Center for Substance Abuse Research which provides the infrastructure that nurtures research and training on the biological basis of addiction and other topics related to drugs of abuse. This provides the trainees with a rich environment in which to pursue substance abuse research. The Drugs of Abuse Training Program is organized around the needs of the trainees and includes didactic instruction through a set of core courses on the pharmacology of drugs of abuse; exposure to clinical aspects of substance abuse and addiction; a seminar series and journal club focused exclusively on drugs of abuse, addiction, and HIV/AIDS; an annual retreat; opportunities to develop oral and written communication skills; annual self-assessments and faculty evaluations of progress; training in ethical research practices; numerous career development activities; and immersion in laboratory approaches that range from molecular and cellular biology through behavioral pharmacology. The Drugs of Abuse Training Program reliably recruits outstanding trainees including individuals from diverse backgrounds and has a near perfect record of completion. The program has been successful in, and remains committed to, preparing pre- and postdoctoral trainees to become productive independent scientists in the substance abuse field.

University of California-Berkeley

Program Representative(s): Dan Feldman, PhD

Our training program provides rigorous academic and research training and emphasizes multi-disciplinary approaches and new, emerging methods, with the goal of fueling paradigm shifts in how we study the brain. Our 48 training faculty are from 12 departments, and represent neuroscience research from molecules and genes, to cells and circuits, systems and computation, behavior and cognition. Our faculty is well-integrated, collaborative, and united under the Helen Wills Neuroscience Institute (HWNI), which is the intellectual center for neuroscience at UC Berkeley. This training program primarily supports PhD students in the Neuroscience PhD Program, which offers broad-based training in neuroscience research, and a smaller number of students in 3 additional PhD programs in our training faculty laboratories. All students receive the same broad-based neuroscience coursework, research, and professional skills training. Each student is supported in Years 1-2 of PhD training. Our program provides training across a wide range of neuroscience, from molecules to mind. We combine flexible coursework, rigorous research training, quantitative skills, and a major focus on advanced research methods. Our multi-disciplinary approach to neuroscience leverages Berkeley's deep expertise in molecular and cell biology, physical and computational sciences, engineering and psychology. We require broad-based neuroscience coursework, laboratory rotations and thesis research, an experimental Boot Camp course, and a Statistics/Quantitative Methods class. We provide substantial professional skills training and career advising. Seminar series, journal clubs, and an annual campus-wide retreat provide rich exposure to modern neuroscience research. A multi-tiered advising system provides extensive scientific and career advising. Our students conduct innovative research and publish in top journals. We have a solid track record in recruiting and graduating diverse PhD students. The great majority of past trainees have gone on to productive careers in academic biomedical research and industry. Innovative new training elements will further prepare our students for cutting-

edge research careers.

University of California-Davis

Program Representative(s): Cristeta Rillera

The goal of the program is to provide a broad training in the fundamental principles of neuroscience for entering students that will lay solid foundations for their specialized research in advanced years. It also provides them with the broad perspective essential for their establishing successful independent research programs in neuroscience in their future careers. The program operates under the auspices of the interdisciplinary graduate program in neuroscience at UC Davis, which offers the scope and flexibility needed to meet our training objectives. Trainees receive one year of support from the grant, typically in their first year. Internal support mechanisms and other extramural grants including individual fellowship awards are used for support of the remaining years of graduate training. Trainees participate in a teaching program especially designed to give exposure to as broad a range of modern neuroscience subdisciplines and technologies as possible including cellular and molecular neuroscience, neuroanatomy and neurophysiology, neurogenetics, systems neuroscience, cognitive neuroscience, computational neuroscience and, the neurobiology of psychiatric and neurological disease. Trainees receive a rigorous basic training through formal course work, seminars and journal clubs and laboratory rotations and participate in colloquia in which they are expected regularly to make oral presentations. Students will thus be well prepared for their dissertation research and for future, independent careers in basic and disease-related neuroscience research.

University of California-San Diego

Program Representative(s): Tim Gentner, PhD; Gentry Patrick, PhD; Brad Voytek, PhD; Erin Gilbert

The Neurosciences Graduate Program (NGP) at the University of California, San Diego (UCSD) is committed to training the next generation of neuroscience researchers, clinician-scientists and academicians. Over the past 20 years, the UCSD NGP has become one of the top neuroscience graduate programs in the country, ranked 4th in the nation in the 2010 National Research Council ranking. This training grant supports the first- and second-year students in the program, and is endorsed by strong institutional support from the participating departments at UCSD, the Salk Institute, The Scripps Research Institute and the Sanford-Burnham Medical Research Institute. These institutions are world-class research centers on the Torrey Pines Mesa, with the UCSD campus as the home academic institution. The NGP provides the broad umbrella that unites neuroscientists from all these institutions. The NGP provides trainees with a rich curriculum covering a broad spectrum of sub-disciplines in neurosciences, mentored research in the individual laboratories of outstanding investigators, and collaborative opportunities across different programs. The NGP responds to emerging areas of interest; a new formal specialization that expands the scope of training is Computational Neuroscience, added in the past few years. The NGP's training plan is structured such that the students form close interactions with each other and with the faculty upon entry to the program. Incoming students receive intensive hands-on laboratory training through the NGP Boot Camp, which also gives the students a unique bonding experience and initial exposure to the breadth of NGP research options. Following the core courses and three research lab rotations, students choose their dissertation thesis labs at the end of the first year. Each student's progress is monitored through an integrated series of cohesive formal evaluations. All students take a required course for scientific conduct and ethics. Students are enriched through a variety of activities that facilitate and enhance the interactions between students and training faculty. Career advising and mentorship are in place at each successive year. Vertical interactions among students from different years are facilitated through journal club, research rounds, and a prestigious seminar series organized and run by the NGP students, and the annual recruitment and retreat activities. Recruitment and admission to NGP is highly competitive. The program makes dedicated efforts to improve the recruitment and retention of under-represented students; the NGP ranks the top in representation of URM population among the UCSD graduate programs for STEM (Science, Technology, Engineering and Math). The research productivity of the trainees is outstanding, and a large fraction of former trainees continue in scientific research and higher education. Over the next five years, the UCSD School of Medicine has set a goal to

increase the size of the program through enhanced institutional support, with a strong commitment to improving the program's diversity.

University of Colorado School of Medicine

Program Representative(s): Diego Restrepo, PhD; Sondra Bland, PhD; Ernesto Salcedo, PhD

This Jointly Sponsored Training Grant currently funds pre-thesis Ph.D. students in the Neuroscience Training Program (NSP) at the University of Colorado, School of Medicine. The NSP is an interdisciplinary Ph.D. granting degree started in 1986 that has been funded by the Jointly Sponsored Training Grant since 2001. The NSP has 60 faculty members of whom 56 are on this application. The faculty have an outstanding training record. Our graduates have a strong record of achievements as academicians and scientists. The average number of manuscripts published by our graduate students during their tenure was 3 manuscripts. The focus of the NSP is on training outstanding neuroscientists and academicians who will make significant contributions to neurobiology, become leaders in the field and impart these qualities to future generations of neuroscientists. In addition, we aim to foster development of students who approach research in a responsible, professional manner. In the last funding period, the NSP had its external review and acted quickly to put the reviewers' recommendations into practice. The Curriculum Committee, working in close collaboration with the Director, refined the curriculum designed to attain these goals. The emphasis of NSP is on fostering increasing independence, responsible conduct and critical thinking through courses and laboratory rotations in the first year of instruction so that, in the second year and beyond, we have students who think independently and develop, troubleshoot and communicate effectively the results of their own hypothesis-driven projects.

University of Iowa

Program Representative(s): C. Andrew Frank. PhD

This program focuses on integrated, broad-based, fundamental, multidisciplinary predoctoral training of first- and second-year (pre-thesis) students in Neuroscience at the University of Iowa. The program builds on three decades of success in matriculating and training top-caliber students, on stable, mature leadership, and on a sharp increase over the past five years in the quality and depth of our applicant pool. The program is modest in size (48 current students) but stellar in quality, and draws on a long tradition of close interactions among scientists with primary appointments in basic and clinical departments, and their expertise in mentoring students, formally and by example, in the interplay between basic and clinical research. The Training Faculty are 44 extramurally-funded neuroscientists with research interests that span the gamut of neuroscience, from ion channels to consciousness. The preceptors have extensive experience and success training students. Students participate in a well-developed, mature curriculum that offers broad and fundamental training in neuroscience, spanning the breadth of the field in terms of levels of analysis (from molecules to integrated functional systems) and diversity of approaches (from patch clamp microelectrodes to human lesion-deficit and functional neuroimaging to translational research), with a special focus on the neuroscience of disease and disorders (including an NIH- supported Neurobiology of Disease course), along with training in statistics and experimental design. The program incorporates three laboratory rotations, regular programmatic activities (lab meetings, seminars, journal clubs, retreats), and comprehensive, mandatory training in responsible conduct of research. The "value-added" feature of our Program is especially compelling-major increases in the quantity and quality of applicants, matriculation and retention of students from diverse backgrounds, an outstanding time-to-degree of just over 5 years, a completion rate of over 80%, outstanding student publication records, and placement of graduates in prominent neuroscience-related academic positions. Our program remains committed to training a diverse and highly expert workforce of neuroscientists who will assume leadership roles related to the Nation's biomedical and behavioral research agenda.

University of Maryland Baltimore

Program Representative(s): Renee Cockerham, PhD; Jessica Mong, PhD

The Program in Neuroscience (PIN) at the University of Maryland Baltimore provides contemporary predoctoral training with exceptional trainee outcomes in the discipline of neuroscience. Major objectives of the program include 1) continued development of innovative educational techniques that harness the power of portable computing (iPad Initiative) and the opportunities they offer for accessing knowledge, "flipped classrooms", visualization, presentation and communication, and 2) a well-honed Core Course Curriculum that provides students with diverse educational backgrounds a deep knowledge of biological principals and critical thinking thereby building a platform for life-long learning and scientific discovery. Supplemented by a continuously up-dated menu of required and elective courses, recently including Translational Psychiatry, Behavioral Neuroscience and Biostatistics Flipped, this curriculum fulfills our long-term goal of producing students with enduring learning skills that foster creative thinking and flexible problem solving, equipping them with the capacity to meet future challenges and opportunities. Career development is enhanced by multiple mechanisms including: 1) PIN specific Proseminar in Hypothesis Testing and Experimental Design; 2) opportunity to minor in Pharmacology, 3) grant and scientific writing workshops, 4) extensive training in oral, presentation and interviewing skills and 5) multiple and varied enrichment activities with local scientists in government, pharmaceuticals, biotechnology and non-profit organizations. This training program provides the financial stability and organizational structure that frames the overall PIN, amplifying the impact of neuroscience in the larger Graduate Program in Life Sciences, the umbrella organization for PIN and seven other PhD granting programs. Consistently successful recruitment has been stable for many years, combined with increasing numbers of TGE and URM applicants and a faculty that has competed exceptionally well for research funding in challenging times. The University of Maryland Baltimore is a professional campus in an urban setting with a long-standing commitment to graduate education with the strong support of the Schools of Medicine, Dentistry and Nursing as well as the Graduate School.

University of Michigan

Program Representative(s): Audrey Seasholtz, PhD; Edward Stuenkel, PhD

The 'Early Stage Training in the Neurosciences' (ESTN) was founded at The University of Michigan (UM) in 2001 and serves as a centerpiece of the Neuroscience Graduate Program's (NGP) training, whose goal is to support broad predoctoral training of exceptional researchers in neuroscience toward careers that address the nation's basic science and biomedical research needs. To be eligible for ESTN support, students must gain admittance to the NGP, which is the most selective biomedical science department/program at the University of Michigan, through either direct or PIBS admission. The ESTN consists of 79 faculty representing 24 departments in 5 schools or colleges. The wide academic distribution, strong research funding and high-level of peer recognition of the ESTN faculty excellently matches this application's focus on broad early stage training in neuroscience. In light of the NGPs growth in training activity, resources, serving as the nexus of crossdisciplinary neuroscience training at the University and the strong institutional commitment we request 9 students be supported by the ESTN. In the first year, students complete a broad-based neuroscience curriculum that includes: neuroscience "bootcamp", principles of neuroscience, human neuroanatomy, statistics, research responsibility and ethics, and neuroscience research seminar, in addition to performing two to three research rotations. ESTN trainees are exposed to a broad range of research areas including: Molecular and Cellular Neuroscience; Developmental Neuroscience; Sensory Neuroscience; Cognitive Neuroscience; Behavioral and Systems Neuroscience; Computational Neuroscience; and Clinical Neuroscience. During their second year, students take elective courses, give a research seminar presentation, complete a candidacy examination and begin work on their doctoral thesis. The NGP at University of Michigan is quite proud of its strong history of recruiting and training underrepresented minority students. The NGP organizes a growing number of specific activities towards the goal of improving graduate training of its students so as to create an interactive, supportive and cohesive neuroscience community that successfully facilitates intellectual and research-intensive training. In addition, it has mentored trainees in the importance of grant writing, which has led to considerable success in their reception of external research fellowships. Upon completion of their training, our

graduates are poised to tackle a host of basic neuroscience and/or public health issues ranging from the molecular basis of neurodegenerative disorders to brain circuit abnormalities in psychiatric disease.

University of Pennsylvania

Program Representative(s): Kelly Jordan-Sciutto, PhD

The Training Program in Neuropsychopharmacology will train scientists who will carry out productive research in their individual fields effectively at the "preclinical-clinical" interface, and more effectively translate research from the laboratory to the bedside in mental health. This objective is addressed by having the Fellows attend specific courses and activities, by arranging for exposure of all non-physicians to clinicians and by facilitating interactions between preclinical and clinical investigators. The didactic portion of the Program comprises about 15% of a Fellow's time; most of their time is spent doing research in the facilities of one or more of the 29 faculty members of the Training Program. The approaches and expertise of the faculty are broad and diverse, and enable us to provide training at the molecular, cellular, neuroanatomical, animal behavioral and/or clinical level. The program currently supports four postdoctoral and two predoctoral Fellows yearly. Postdoctoral Fellows in the Program will be either (1) students with doctoral degrees in pharmacology, psychology, psychobiology or a related discipline, or (2) physicians who have completed at least three years of specialist training in psychiatry or, in selected instances, other specialty areas (e.g., pediatrics, neurology). One of the postdoctoral slots is targeted preferentially to a physician-scientist. Predoctoral fellows will be graduates of a four-year program in biology, chemistry, psychology or a related discipline; upon successful completion of the program, they will receive a doctoral degree in pharmacology or neuroscience. The multidisciplinary program involves faculty from six departments in the School of Medicine as well as faculty from the Schools of Veterinary Medicine and Arts and Sciences. The faculty members of the Training Program have a history of collaboration in both teaching and research projects, and could easily accommodate co-mentoring arrangements between physicians and non-physicians. The predoctoral Fellows are advanced graduate students in pharmacology or neuroscience and take a series of courses designed to provide them with background in the anatomical, biochemical and physiological bases of pharmacology, with an emphasis on neuropsychopharmacology. Specific courses taught by Training Program faculty and other activities have been developed that emphasize the consideration of clinical practice in psychiatry in the conduct of basic research related to behavior.

University of Southern California

Program Representative(s): Pat Levitt, PhD

The mission of the University of Southern California (USC) Neuroscience Graduate Program (NGP) is to provide an outstanding academic environment in which today's aspiring neuroscientists receive support and mentorship. This allows them to flourish in their scholarly pursuit of understanding normal and diseased nervous system structure and function. NGP faculty and administrative leadership are dedicated to the guidelines of the program, engaged in training for responsible conduct in research, and focused on recruitment of underrepresented minority, disabled and disadvantage students. The NGP emphasis for trainees is on developing research and science communication (verbal and writing) skills, a fundamental understanding of individual and community responsibility in the ethical pursuit of scientific inquiry, and encouraging trainee creativity and work ethic. Trainees are fully engaged in their training experience through the efforts of their student organization, the USC Neuroscience Graduate Forum (NGF). The NGF and NGP plan and implement professional development activities in ethics, career development, grant writing workshops, communication skills, student diversity recruitment, advanced technologies workshops, student symposium day and annual retreat, and advanced course planning. Student progress is tracked vigorously to ensure on time qualifying exam, research progress and graduation. All of these elements are essential for developing diverse and productive next-generation neuroscientists who will lead research efforts in academic and private sector settings. The NGP embraces the NIH mission that developing the highest caliber neuroscientists for the near and long-term future requires an emphasis on trainees gaining a focused research expertise while, at the same time, building a professional skills toolkit for maximizing their pursuit of investigating challenging

questions through interdisciplinary collaboration. Training faculty research is extensive in emphasis areas of Cognitive, Computational and Systems Neuroscience, Neuroengineering, and Developmental and Cell/Molecular Neuroscience. Research across disciplines investigates mental illness, neurological disease and aging. Fifty-seven faculty of the NGP form the core of the T32 program, with an annual average of 87 trainees. Many of the training faculty joined USC and Children's Hospital Los Angeles (CHLA) over the past 7 years. This reflects USC's commitment to the discipline through extensive senior and junior faculty recruitment, and the establishment of new research institutes that provide trainees with cutting edge, productive training environments.

University of Texas Health Science Center at San Antonio

Program Representative(s): Alan Frazer, PhD;

The Neuroscience Program at UTHSCSA provides didactic and laboratory training in a range of subject areas and levels of analysis from molecular, cellular, and neurochemical to systems, behavioral, and clinical, all focused on the regulation and function of the nervous system. Drawing on the expertise of approximately 50 faculty from 5 basic science departments and 8 affiliated departments or divisions within the medical and dental schools, we emphasize a flexible program of study and research tailored to the individual needs and interests of all students in Neuroscience. In addition to track-specific fundamental and elective courses, we offer a rich diversity of research rotation opportunities, upper-level elective courses, and a broad selection of faculty dedicated to mentoring graduate students in dissertation research. In addition, Neuroscience students will enjoy a number of enrichment opportunities, including journal clubs, seminars, an annual retreat, participation in brain awareness week activities, and several social functions. Students are encouraged to present their research in a variety of settings, to attend professional meetings locally, nationally and even internationally, and to publish their work in peer-reviewed professional journals. Our program is the recipient of a Neuroscience T32 training grant. A highly interactive community of faculty, post-doctoral fellows, laboratory staff and fellow students all contribute to a challenging, stimulating and supportive environment within which our students can develop into successful neuroscientists.

University of Utah

Program Representative(s): Richard Dorsky, PhD

Research in neuroscience has become increasingly interdisciplinary; it is not possible to understand the nervous system by focusing on a narrow area of expertise. The principle underlying the graduate education offered by the University of Utah Interdepartmental Program in Neuroscience is that students are given the tools to study a problem from a very broad perspective. This includes the application of diverse approaches that include classical embryology, molecular biology, electrophysiology, behavior, and pathology. Our program offers training in three fundamental areas critical for successful research science careers: didactic training in all areas of neuroscience, research opportunities in diverse areas supervised by outstanding mentors, and multifaceted career skill development throughout the training period. 74 graduate program faculty members from 19 participating departments are aligned in five specific areas of expertise: neurobiology of disease, molecular neuroscience, cellular neuroscience, brain and behavior, and developmental neurobiology. These five areas reflect the breadth of the graduate program and provide exceptional opportunities to the 49 current students. 37 outstanding faculty members, chosen from this group based on research productivity, funding, and mentoring skill, participate in the T32 training program. Our former T32 trainees, the first of whom received their Ph.D. in 2011, have been remarkably productive and have obtained postdoctoral fellowships at Harvard, Columbia, HHMI/Janelia Farm, and UT Southwestern. There is no doubt that many of them, as well as future trainees, will become leaders in neuroscience research.

University of Washington School of Medicine

Program Representative(s): Jane Sullivan, PhD

The Graduate Program in Neuroscience, established at the University of Washington in 1996 comprises 48 students and 141 faculty members from 27 departments and 4 partner institutions

across the city of Seattle. Our goal is to train the best neuroscientists possible, fostered by inclusion of students from diverse and underrepresented backgrounds. We have exceptional breadth and depth of research interests, including neurodevelopment, neurodegeneration, addiction, ion channel physiology and pathology, systems neuroscience, and computational neuroscience. The breadth of our faculty allows us to provide interdisciplinary training drawing from a variety of techniques and approaches, including neuroanatomy, biochemistry, molecular biology, physiology, biophysics, pharmacology, in vivo brain imaging, computational modeling and behavior. In addition to a solid core of required and elective courses, students also receive instruction in other key areas of professional development on topics including grant writing, public speaking and bioethics. Faculty mentors and the Graduate Training Committee closely monitor student progress to ensure that each student receives the guidance he or she needs to succeed. Graduates emerge from the program prepared to conduct independent research and equipped to pursue a variety of career paths. One of the primary attractions of our program is that it accommodates students with diverse academic backgrounds, and offers a wide selection of faculty with whom to work. By supporting early-stage students while they remain substantially engaged in important components of their training outside their dissertation labs, this training grant will give our students greater independence and control at a critical stage of their graduate careers, and make a significant contribution to the continuing success of graduate training in neuroscience at the University of Washington.

Vanderbilt University

Program Representative(s): Danny G. Winder, PhD

This training program at Vanderbilt University is structured to support the early phases of neuroscience predoctoral education and training. In support of the overall NIH mission, the overarching objective of the program is to provide an exceptional training environment for the next generation of neuroscientists, and is built on the foundation of a strong training faculty with exceptional records of scholarship, research support and graduate mentoring. The heart of this mission is expressed in the academic and research goals of the program, which are to provide our students with a strong didactic foundation in the neurosciences through our core curriculum offerings, and to provide them with the opportunity to carry out state-of-the-art neuroscience research in the laboratories of a group of highly successful and committed mentors. In addition, the program has strong emphases on professional development and diversity, with the objective of building the requisite skills needed for success in graduate school and beyond, and of training an inclusive cadre of future independent investigators in neuroscience research. The Neuroscience Graduate Program at Vanderbilt is an interdisciplinary program that encompasses four different colleges and schools and 18 departments. Students can enter the program either directly or via three umbrella “feeder” programs (IGP/MSTP/CPB). Traditional and emerging areas of research strength in the program include: attention, brain evolution, cell signaling, cognitive neuroscience, circadian function, CNS drug development, development and developmental disabilities, molecular genetics, neurodegeneration and neurotoxicity, neuroimaging, plasticity, psychiatric illness, sensory and multisensory systems, synaptic transmission, and vision.

Wake Forest University Health Sciences

Program Representative(s): Carol Milligan, PhD

Our training program is based on the belief that neuroscience broadly conceived provides a fundamental framework for understanding the biological basis of behavior and is critical for revealing the causes of neurological and psychiatric disorders. Accordingly, our major goal is to train students to be able to carry out meaningful and significant research in all areas of modern neuroscience and to give them an appreciation of the importance of all levels of organization, from genetics and molecular approaches to behavioral and physiological aspects, with an understanding of how basic neuroscience research is key to finding treatments for neurobehavioral pathologies and translating this information to the clinic. We hope to encourage and prepare students to take advantage of new research areas and to use a variety of methodologies throughout their research careers. Students should be prepared to use whatever conceptual and methodological approaches are most appropriate for pursuing promising new areas of research. This requires that students be trained to appreciate a research

setting in which collaborations and interactions among investigators using different techniques and approaches is commonplace. We are strongly committed to our students' career development. A unique aspect of our program is that we provide several opportunities for our students to provide them with a strong arsenal of training and experience to make them competitive for the increasing opportunities for both non-academic and non-research careers that utilize their scientific and scholarly training. We believe that the training program, resources and environment provided by the Neuroscience Program at Wake Forest University accomplishes all of these goals.

Washington University in St. Louis

Program Representative(s): Erik Herzog, PhD

The fields of biology, psychology and biomedical engineering have generated exciting new advances in the study of neural systems underlying behavior. However, the rapid advancement of scientific progress has been limited by the traditional boundaries separating the disciplines. At Washington University, we have developed a predoctoral training model to overcome this impediment: The Cognitive, Computational, and Systems Neuroscience (CCSN) Pathway produces rigorously trained investigators who lead a new generation of brain scientists. CCSN serves students from the PhD programs in Biomedical Engineering, Psychology, and Neuroscience. The core of CCSN is a two-year curriculum emphasizing transdisciplinarity, collaboration and project-based instruction. In the first year, students take courses in Cognitive Psychology, Biological Neural Computation, and Neural Systems. In their second year, students participate in two unique capstone courses: Advanced CCSN and Project Building in CCSN. Advanced CCSN consists of a series of interdisciplinary case studies in cutting-edge brain science topics. Each topic is presented as a module by an interdisciplinary faculty team. Modules include team-based projects and peer review as well as primary source readings and classroom lectures and discussions. In Project Building in CCSN, each student designs an independent interdisciplinary research project. The faculty leader helps them assemble an interdisciplinary faculty advising team of 3-5 mentors, to whom they present their project multiple times throughout the semester. Faculty advising is complemented by peer advising, including written peer review, culminating in a research grant-style project proposal. Surrounding the core CCSN curriculum is a rich penumbra of activities. These are designed to provide intellectual training and to build a cohort of scientists with the knowledge and social skills necessary to conduct research in interdisciplinary teams. Formal coursework is augmented by an intensive transdisciplinary crash course preceding Advanced CCSN and by a mini-course in scientific programming. Immersive Encounters with distinguished visiting scientists provide high-intensity exposure to cutting-edge research. In collaboration with the Saint Louis Science Center, CCSN trains students to communicate with the public and helps them build programs and presentations to teach children and adults about the brain and mind. CCSN has produced cohorts of young brain scientists on the fast track to new discoveries.

Yale University

Program Representative(s): Charles A. Greer, PhD; Michael Crair, PhD

The Interdepartmental Neuroscience Program (INP) is Yale's university-wide interdepartmental doctoral program, currently in its 27th year. The faculty of the INP's T32 Jointly Sponsored NIH Predoctoral Training Program consists of 82 neuroscientists from departments of the Faculty of Arts and Sciences (FAS) and the Yale Medical School (YMS). Students are admitted through a neuroscience admissions committee that is part of the Biological and Biomedical Sciences (BBS) program of Yale. Upon affiliating with the INP the students remain within the interdepartmental program through their graduation. The INP is actively involved in educating students from underrepresented ethnic and/or racial groups. Since 2010 11% of the US/permanent resident neuroscience students in the program were from these groups. All INP students take four core graduate classes in neuroscience and bioethics, three advanced course electives, and two 1st year research rotations. They attend invited seminars, research in progress talks, an annual retreat and attend the Society for Neuroscience meeting at the program's expense. In the 2nd year the students select a doctoral adviser from the pool of participating faculty. They also take the doctoral qualifier examination, which has tutorial, written, and oral components. The students advance to candidacy for the PhD upon defending a prospectus in the 3rd year. All students

are provided travel funds to attend and present their work at national meetings. A PhD in Neuroscience is awarded to graduates by the INP. Our students and alumni develop rational approaches to understand the outstanding problems in nervous system function, and through their research advance practical solutions for the disorders of the nervous system that afflict society.

MENTORING RESOURCES AND PROFESSIONAL CONFERENCES

"MENTOR: SOMEONE WHOSE HINDSIGHT CAN BECOME YOUR FORESIGHT"

Look for Mentoring articles on SfN Neuronline
http://neuronline.sfn.org/Career-Specific-Topics/Professional-Development

How to Get the Mentoring You Want: A Guide for Graduate Students at a Diverse University
http://www.rackham.umich.edu/downloads/publications/mentoring.pdf

Making the Right Moves and Training Scientists to Make the Right Moves
http://www.hhmi.org/programs/resources-early-career-scientist-development

Individual Development Plan (IDP), a Web-based career-planning tool created to help graduate students and postdocs in the sciences define and pursue their career goals
http://myidp.sciencecareers.org/

JustGarciaHill: A Virtual Community for Minorities in Sciences
http://justgarciahill.org/

The Leadership Alliance
http://www.theleadershipalliance.org/

NIDA Mentoring Guide
http://www.drugabuse.gov/sites/default/files/mentoringguide.pdf

National Research Mentoring Network
https://nrmnet.net/

PROFESSIONAL CONFERENCES

Venues for professional development activities, scientific presentations and networking opportunities with diverse peers, faculty and academic biomedical research Institutions

Association of American Indian Physicians (AAIP)

Annual Biomedical Research Conference for Minority Students (ABRCMS)

Association of Minority Health Professions Schools, Inc. (AMHPS)

Hispanic Association of Colleges and Universities (HACU)

Society for the Advancement of Chicanos and Native Americans in Science (SACNAS)

Neuroscience Scholars Program (NSP) at Society for Neuroscience

BUILDING RESEARCH ACHIEVEMENT IN NEUROSCIENCE (BRAiN)

UNIVERSITY OF COLORADO DENVER
Principal Investigator: *Dr. Diego Restrepo* - University of Colorado Denver
Principal Investigator: *Dr. Barbara Lyons* – New Mexico State University
Principal Investigator: *Dr. Sondra Bland* – University of Colorado Denver Downtown Campus
Partner Institution: New Mexico State University

PROGRAM DESCRIPTION:
Student Training through Institutional Partnerships will bridge the Neuroscience research participation gap by preparing diverse undergraduates in the Rocky Mountain and Southwest Region for successful entry to Neuroscience Ph.D. programs.

BRAiN unites preexisting formal research and education programs at diverse institutions: the Neuroscience Graduate Program at the University of Colorado Denver in the Anschutz Medical Campus (NSP at UCD-AMC), home to a T32 Neuroscience Training Grant; the RISE to Excellence biomedical research education program at New Mexico State University (NMSU), a Hispanic serving minority institution; and the undergraduate Brain and Behavior program of the Department of Psychology at the University of Colorado Denver downtown campus (UCD-DT). BRAiN aspires to expand through developmental partnerships with Colorado State University-Pueblo and other colleges in the region.

Broad participation in the Ph.D. Neuroscience/Behavior pipeline will be enabled through pursuit of three specific aims: (1) Recruitment of 67 BRAiN Scholars from diverse demographic groups that are nationally underrepresented in biomedical and behavioral neuroscience research; (2) Development of the Neuroscience/Behavior research expertise and professional skills of BRAiN Scholars; (3) Retention of BRAiN Scholars in Neuroscience/Behavior research through enrollment in postgraduate programs.

BRAiN will provide intensive training that combines mentored independent research with student development of a rich knowledge base in Neuroscience core concepts. Curriculum integration will be achieved through a common Neuroscience Seminar Series and a Neuroscience Core Course. Emphasis will be placed on enhancement of mentorship skills through activities such as the Neuroscience Mentor Academy where faculty will meet to discuss student training, program evaluation, and curriculum reform. Taken together, proposed activities will provide an integrated research and professional development experience across multiple sites that leverages 21st century resources for scientific investigation and is responsive to practical aspects of contemporary student life.

ADDITIONAL PROGRAM TEAM MEMBERS:

Dr. Elba Serrano – New Mexico State University
Dr. Ernesto Salcedo – University of Colorado Denver Anshutz Medical Campus
Mr. Isaac del Rio – Research Education Facilitator, New Mexico State University

ENDURE TRAINEE ABSTRACT

JACQUELINE FIGUEROA

Home Institution and State: **New Mexico State University, New Mexico**
Email: **tamashii@nmsu.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biochemistry, May 2017**
Mentors/Advisors at Home Institution: **Dr. Giancarlo Lopez-Martinez**

ENDURE Trainee Scientific Interest:

My interests involve understanding the underlying mechanisms of aging, and how they affect our brain and nervous system. Under Dr. Lopez guidance I'm investigating whether hormetic conditioning can be used as an effective method towards not only increasing longevity, but towards protecting and repairing the brain and central nervous system from damage and disease.

ENDURE Trainee Career Goals and Plan:

My career goals involve earning a MD-PhD in Neuroscience, becoming a neurologist and/or neurosurgeon, as well as possibly working for the NIA (National Institute on Aging). Overall I hope to own my own lab one day, and become a leader in my field of research.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Anschutz Medical Campus**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Curt Freed and Dr. Breanna Symmes**

ENDURE Research Project Title: **Fibroblast Differentiation to Dopamine Neurons Using Small Molecules**

Parkinson's disease is a crippling neurological disorder resulting in tremors, dyskinesia, rigid posture etc. The disease is the result of the loss of dopamine neurons in the substantia nigra of the brain, and is progressive. Some of the current treatments focuses on replacing these dopamine neurons through transplantation, and has garnered some amazing results including patients regaining the majority of their motor control. Yet the source for these dopamine neurons is currently fetal tissue, which is difficult to obtain and in overall low abundance. Thus this treatment is not completely feasible for all the thousands of patients suffering with the disease. To overcome this issue, our research focused on creating dopamine neurons by using a common cell type as our template, and only a small molecule formula. Different formulas were used to determine greatest cell conversion and survival, and cells were tested for differentiation using neuronal marker MAP2 and dopamine marker Tyrosine Hydroxylase. Results suggest our formula has the capability to differentiate fibroblasts into neurons, and a formula for maximum cell survival and conversion was established.

ENDURE TRAINEE ABSTRACT

JEANELLE FRANCE

Home Institution and State: **University of Colorado, Boulder**
Email: **jefr4644@colorado.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Neuroscience, Spring 2017**
Mentors/Advisors at Home Institution: **Robert Spencer**

ENDURE Trainee Scientific Interest:

I am interested in the application of cutting edge research tools to investigate the structure and function of the nervous system in vivo from synapse to circuit. The scope of my research interests are far reaching and encompass transgenic animal models as well as human patients undergoing invasive neurosurgical interventions. At this time I am most interested in neuropharmacological mechanisms of action, biological basis of psychiatric and movement disorders, circadian rhythms and electroceutical technology.

ENDURE Trainee Career Goals and Plan:

I would like to establish and maintain research facilities at off shore medical schools in the West Indies. There is a severe lapse in medical research with data from predominantly black populations, and I hope to help fill this void. I plan to use the infrastructure at these medical schools to train students, especially residents of the islands, to conduct meaningful research. My family has a long history in the Caribbean, and my uncle was instrumental in establishing medical schools throughout the islands. I hope to follow in my family's footsteps to help further develop quality medical education in the Caribbean.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution:

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. John Thompson**

ENDURE Research Project Title: **An Analysis of Cortical and Subcortical White and Gray Matter Volume in Patients with Movement Disorders Prior To Deep Brain Stimulation Treatment**.

Subthalamic deep brain stimulation (DBS) is the most popular treatment for Parkinson's disease (PD) and Essential Tremor (ET) patients that do not respond to medication. Many studies have analyzed neuroanatomical markers in untreated PD and ET patients, but few have quantified anatomical structures in these patients before DBS treatment. The purpose of this study is to examine underlying gray and white matter volumes in patients with PD and ET prior to implantation of DBS electrodes.
Subcortical segmentation and total cortical parcellation was conducted using a combination of FreeSurfer, Statistical Parametric Mapping (SPM12), A Computational Anatomy Toolbox (CAT12) and ITK SNAP. Initially, it was postulated that basal ganglia structures would show reduced volumetric measurements in PD patients because PD is a known neurodegenerative disease. However, the analysis showed no difference in volume in any of the regions of interest between PD and ET patients. Volumetric measurements may not be able to identify subtle changes in neuroanatomy; Therefore, further research will analyze regional connectivity to better understand the underlying neurocircuitry of these two populations of DBS patients.

ENDURE TRAINEE ABSTRACT

JOSI GABALDON

Home Institution and State: **New Mexico State University, NM**
Email: **jgarbald@nmsu.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Kinesiology, May 2017**
Mentors/Advisors at Home Institution: **Robert Wood**

ENDURE Trainee Scientific Interest:

Interests include hands on human and/or animal subject research in biomechanics, gerontology, and/or Alzheimer's disease. Ultimately, I want to improve the longevity of lives in citizens and make a positive impact on their lives.

ENDURE Trainee Career Goals and Plan:

I anticipate to apply my knowledge of research to a biomedical career where I can continue research on Alzheimer's disease, biomechanics or gerontology and travel around communities to support patients suffering from disturbances of aging with the knowledge I know. With this I hope to help my elders live longer, joyful and healthier lives.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Colorado Denver Anschutz Medical Campus**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Emily A. Gibson, Dr. Diego Restrepo**

ENDURE Research Project Title: **Optimizing an Olfactometer for Two-Photon Microscopy Neuroimaging**

This project was to make modifications to a previous model of an olfactometer to make it suitable for *in vivo* 3D two-photon microscopy. The olfactometer is a computer-controlled instrument used for studying odor detection and odor discrimination in rodents. The behavioral test is a go-no go odor discrimination task where a water deprived mouse learns to respond to an odor rewarded with water delivery, and not respond to an unrewarded odor. The modified olfactometer will facilitate neuroimaging using a novel miniature fiber coupled microscope during olfactory learning in the go-no go task. Future work will include optogenetics as well as a 3D multiphoton fiber-coupled microscope to record live images of the olfactory bulb, piriform cortex and the hippocampus. Comprehending the olfactory system in mice can help us appreciate the importance and complexity of human olfaction.

ENDURE TRAINEE ABSTRACT

MARK D. HOLLOMAN

Home Institution and State: **University of Colorado, Denver, Colorado**
Email: **mark.holloman@ucdenver.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **May 1, 2017**
Mentors/Advisors at Home Institution: **Dr. Sondra Bland, Dr. Jim Grigsby**

ENDURE Trainee Scientific Interest:

My specific scientific pursuits include researching human behavioral systems. I seek to investigate the influences of neurobiology and physiology on cognitive functioning. I am interested in investigating the various bases of behavior which consider circadian and seasonal rhythms, decision making, energy balance, selective attention and visual perception, social behavior, developmental processes, and examining the physiological substrates of emotion and stress, and motivation.

ENDURE Trainee Career Goals and Plan:

My post baccalaureate career goals comprise acceptance into a behavioral-cognitive neuroscience graduate program which focuses on neuroimaging and neuropsychological approaches in researching human behavior. Within this type of program I seek to gain experience with functional neuroimaging techniques such as Magnetic Resonance Imaging, and Electroencephalography in studying the neural bases of human behavior. This type of academic program will also encompass areas of specialty such as Sensory and Perceptual Processes, Attention and Working Memory, Learning and Memory, Emotion, and Motor Control.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Colorado**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Jim Grigsby, Dr. Sondra Bland**

ENDURE Research Project Title: **Examining the Association Between Autonomic Nervous System Arousal and Executive Functioning.**

A classic psychological theory proposes a unique association between the level of Autonomic Nervous System (ANS) arousal, and levels of mental functioning. The theory suggests that ideal mental functional conditions for a wide range of cognitive tasks tends to occur at an intermediate level of ANS arousal. Over or under-arousal of the ANS shows a marked decline in cognitive performance. The amount of sympathetic arousal required by any given task is most likely to fluctuate as a function of the task's novelty, complexity, and the extent to which the task is dependent on Executive Functioning (EF). In the Grigsby laboratory we seek to assess whether tasks demanding EF will be associated with increased sympathetic-ANS arousal in comparison with tasks that do not. Our study aims to determine if the relationship between sympathetic-ANS arousal and the difficulty of the EF task will increase in a linear fashion. We also aim to assess the relationships between the successful performance of executive tasks, perceived effort, and skin conductance. We postulate that tests of EF are inherently more difficult than those which require little executive ability, because of the effortful and deliberate nature of the former, and the relatively automatic nature of the latter.

ENDURE TRAINEE ABSTRACT

BELKIS JACQUEZ

Home Institution and State: **New Mexico State University, New Mexico**
Email: **yobelkis@nmsu.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biochemistry, Anthropology, 2017**
Mentors/Advisors at Home Institution: **Dr. Mary Alice Scott**

ENDURE Trainee Scientific Interest:

A continuous examination of the evolving symbiotic relationship between health and culture is the cornerstone for my research and professional endeavors. I aspire to devote resources to not only understanding the pathology and biochemistry of emerging diseases but also the underlying cultural implications shaping diagnosis and treatment. My interdisciplinary training in biochemistry and anthropology permit me to view research and the applications of it in a holistic manner. My prime interest is using the technologies of medicine to aid in addressing health disparities in the border region and world-wide. My interest in community development and healthcare systems stem from my passion of travel and are rooted in service.

ENDURE Trainee Career Goals and Plan:

I aspire to enroll in a MD/PhD program upon completion of my undergraduate degree from New Mexico State University in Biochemistry and Anthropology. I intend to continue research in the fields of medical anthropology and to investigate how distinct regions, cultures, and countries accept, diffuse, and implement medicine. I hope to become an avid physician and active scientist in the flied of emerging diseases and the social components of coping with such diseases.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **N/A**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **N/A**

ENDURE Research Project Title: **Involuntary Behavior in Frontotemporal and Alzheimer's Patients**

Frontotemporal dementia (FTD) is a neurodegenerative disease with protein aggregates accumulating in the frontal and temporal lobes of the brain. These lesions cause for changes in a patient's behavior: irritability, changes in response to stimuli, and memory loss. Utilization behavior (UB) is described as a neurological behavior elicited from FTD patients. The few research articles that exist on UB describe it as a patient's inadequacy to resist the need to manipulate objects placed in their field of vision We hypothesized that UB and imitation behavior (IB) could only be elicited from FTD patients and not Alzheimer patients. Here examiners placed objects in front of FTD and Alzheimer's patients and observed whether subjects correctly used objects during the wrong social context. Results showed that UB and IB behavior were elicited from Alzheimer's patients and not FTD patients.

ENDURE TRAINEE ABSTRACT

DANAE MITCHELL

Home Institution and State: **University of Colorado Denver, Colorado**
Email: **danae.mitchell@ucdenver.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Bioengineering, 2018**
Mentors/Advisors at Home Institution: **Dr. Carlos Jimenez-Rivera**

ENDURE Trainee Scientific Interest:

Before starting the ENDURE program my areas of scientific and research interest were many and varied, however after completing my summer project and meeting different people I have narrowed my field(s) of interest to developmental neuroscience, molecular and cellular neuroscience and tissue engineering.

ENDURE Trainee Career Goals and Plan:

After finishing my undergraduate degree, I intend on applying to a neuroscience graduate program with the hope that I can integrate my bioengineering background with neuroscience research. After obtaining my PhD, I plan doing research and academia. Maybe I can be a mentor to an undergraduate someday.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Colorado Denver Anschutz Medical Campus**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Emily Bates, Jayne Aiken, and Dr. Jeff Moore**

ENDURE Research Project Title: Microtubule Mystery: **Investigating the Molecular Consequences of Tubulin Mutants**

Microtubules (MTs) are made up of the tubulin proteins- and-tubulin and can be described as a cell's skeleton. MTs are involved in a number of neuron roles such as neurite initiation, axon stabilization and trafficking, and neuron migration. Mutations in a neuronally expressed -tubulin result in numerous brain malformation disorders, but it's unknown how the-tubulin mutations affect the function of MTs themselves. To examine this, we performed two assays on six different patient-derived -tubulin mutations that lead to different cortical malformations to determine how these mutations affected the tubulins ability to incorporate into the MT lattice and the dynamics of the MT. The data generated in this study will help provide insight to how-tubulin mutations disrupt MT function to lead to the devastating brain disorders observed in patients.

ENDURE TRAINEE ABSTRACT

AMBER OLSON

Home Institution and State: **University of Colorado Denver, Colorado**
Email: **amber.olson@ucdenver.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **BS Psychology, Summer 2017**
Mentors/Advisors at Home Institution: **Dr. Shane Rolen, Dr. Diego Restrepo, Dr. Sondra Bland, Dr. Ernesto Salcedo**

ENDURE Trainee Scientific Interest:

I have long been interested in the behavioral and cognitive issues associated with the developmental disorders Autism, and ADHD, as well as the neuropsychiatric disorders schizophrenia and bipolar disorder. I am also interested in the functioning of the hippocampus, and the prefrontal cortex in relation to these disorders on learning. I enjoy the functional/neurophysiological side of research and look forward to learning optogenetics, imaging, and various techniques to manipulate and observe various aspects of the neuron.

ENDURE Trainee Career Goals and Plan:

I have had a love affair with neuroscience for over 10 years now and have worked hard to follow that passion to where I am today. I would enjoy doing neuroscientific research on behavioral and cognitive functions in relation to Autism, ADHD, schizophrenia and bipolar disorder. I prefer to work within a functional/ neurophysiological frame work utilizing associative learning models, electrophysiology, optogenetics, imaging, and cellular level functional research. Eventually I would also like to incorporate teaching into my career path, either at the undergrad or graduate level. I plan on having a long career doing research in the neurosciences.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Colorado Anshutz Medical Campus**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Shane Rolen, Dr. Diego Restrepo, Dr. Sondra Bland, Dr. Ernesto Salcedo**

ENDURE Research Project Title: **Cognitive Effects on Mouse Model for CaMKIIa Mutation Associated with Schizophrenia**

Schizophrenia is a neuropsychiatric disorder where symptoms are debilitating and include: positive, negative, and cognitive. Historically, research has focused on the positive and negative symptoms, rather than cognitive deficits including working memory, executive function, and impaired ability to maintain focus. Recently missense mutations of the CaMKIIa gene have been identified schizophrenic patients (Purcell et. al., Nature 506, 185-190). CaMKIIa is involved in long term potentiation and therefore these mutations may underlie learning deficits. Our research focuses on whether decreased expression of CaMKIIa elicits deficiencies in associative learning and whether cognitive deficits are accompanied by changes in neural oscillatory activity in the CA3 region of the hippocampus. We used an olfactory associative learning task (oALT) go/no go water-rewarded task to compare behavioral performance between heterozygous CaMKIIa mice (Hets) and wild type controls (WT). We performed local field potential (LFP) recording in CA3, to determine theta/gamma phase amplitude coupling (PAC) thought to play a role in hippocampal learning. In preliminary studies we found that the Het underperformed the WT, and we found differences in PAC for Hets compared to WT. We are following up by determining whether deficiency in learning is correlated with differences in PAC in the hippocampus.

ENDURE TRAINEE ABSTRACT

TAYLOR USELMAN

Home Institution and State: **New Mexico State University, New Mexico**
Email: **t_use15@nmsu.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **5/1/2018**
Mentors/Advisors at Home Institution: **Dr. Elba Serrano; Dr. Barbara Lyons**

ENDURE Trainee Scientific Interest:

I am most fascinated with research on the mind-body connection; understanding various systems of the body and their communication with the nervous system. Similarly, how brain activity regulates learning, memory, as well as corporeal adaption through mechanisms relating to perception and proprioception.

ENDURE Trainee Career Goals and Plan:

Many of my undergraduate goals revolve around developing proficiency in multiple fields of study in order to acquire and utilize a holistic approach to neuroscience research and its applications in medicine, industry, and academia. In the future, I want to advance my expertise in neuroscience through the pursuit of a Ph.D. program in which I can actively participate in research primarily directed toward sensory neuroscience and cognitive psychology. A major goal of mine is to promote the collaboration, dissemination, and application of neuroscience research in order to enhance human performance and wellbeing in any setting; organizational, educational, health, etc.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **New Mexico State University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Elba Serrano**

ENDURE Research Project Title: **Mining Genome Expression Omnibus (GEO) datasets for analysis of TRP channels in glioma cell lines**

Gliomas are aggressive primary brain tumors that arise from glia and are characterized by a low survival prognosis. Recent literature suggests the potential role for TRP channel in glioma proliferation and progression. Through literature review, we found 13 TRP channel genes as candidates for expression analysis in glioma cell lines based on evidence of their involvement in glioma tumor progression and/or their reported role in mechanotransduction. Exploiting bioinformatics strategies, we queried the GEO repository for glioma high throughput datasets and selected a GEO Dataset Record comprising GeneChip Human Genome U133 Plus 2.0 microarray data from 60 cancer cell lines for analysis (GDS4296). Evaluation of normalized expression values unveiled the highest expression for TRPC1, TRPM7, and TRPP1 in all six glioma cell lines included in the dataset as well as data from an astrocytoma cell line used in our lab (CCF-STTG1). We are currently querying GEO for high throughput expression datasets for normal human astrocytes. Future experiments will utilize qPCR to confirm TRP channel expression in glioma cell lines as part of an ongoing examination of glioma proliferation in matrix environments. We conclude that research can be informed through outcomes of the analysis of cell line expression metadata.

ENDURE TRAINEE ABSTRACT

RACQUEL VALADEZ

Home Institution and State: **University of Colorado at Colorado Springs**
Email: **rvaladez@uccs.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Pre-Medicine, Spring 2017**
Mentors/Advisors at Home Institution: **Dr. Eugenia Olesnicky Killian**

ENDURE Trainee Scientific Interest:

Given my clinical interest in research, developmental neuroscience is a fascinating field that is continuously developing and allowing for endless learning opportunities. This research interest will allow me to further pursue my own scientific curiosities while concurrently providing scientific context to a clinical environment, ultimately bettering the lives of patients and further understanding the underlying mechanisms of neurodevelopmental disorders and other developmental processes.

ENDURE Trainee Career Goals and Plan:

Ultimately, I intend to pursue an MD/PhD dual degree following my undergraduate career, and am currently further pursuing my research and bolstering my experience to prepare for graduate school. Through my own clinical and research experiences, I have learned that I personally cannot foresee myself forgoing one of these careers and will ideally simultaneously pursue both, as clinical care and scientific research go hand in hand.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **CU Denver - Anschutz**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Bruce Appel, Dr. Ernesto Salcedo, Dr. Diego Restrepo, Dr. Sondra Bland**

ENDURE Research Project Title: **Prdm8 Expression and Function Within Oligodendrocyte Lineage Cells**

Myelin, a highly specialized membrane formed by glial cells, ensheathes axons to facilitate rapid conduction of action potentials and maintain axon health. In the central nervous system of vertebrates, the glial cells that make myelin are oligodendrocytes. During development, neural progenitors produce oligodendrocyte precursor cells (OPCs) of which a subset differentiate as oligodendrocytes whereas others remain as OPCs into adulthood. The molecular mechanisms that determine whether OPCs differentiate as oligodendrocytes or remain as OPCs are not known. To investigate why some OPCs become oligodendrocytes and others do not, we completed RNA sequencing to identify genes uniquely expressed in oligodendrocytes and OPCs of zebrafish. This revealed that OPCs express prdm8 RNA at relatively higher levels than oligodendrocytes, raising the possibility that prdm8 regulates OPC fate. Previous functional investigations indicate that Prdm8 acts as a transcriptional repressor. Based on these observations I hypothesized that Prdm8 represses the myelinating gene expression program in OPCs. To test this hypothesis, I performed in situ RNA hybridization to detect prdm8 expression in zebrafish embryos and larvae. This showed that both ventral spinal cord progenitors that produce OPCs and OPCs express prdm8, consistent with the possibility that Prdm8 represses myelin gene expression.

BRIDGE TO THE PHD IN NEUROSCIENCE

MICHIGAN STATE UNIVERSITY
Principal Investigator: *Dr. William Atchison*
Partner Institutions: St. Mary's University, Northern New Mexico College, University of Puerto Rico –Arecibo, and University of Puerto Rico - Cayey

PROGRAM DESCRIPTION:
The goal of "Bridge to the PhD in Neuroscience" is to increase the number of underrepresented minority (URM) Ph.D.s trained in neurosciences: specifically to facilitate their entry into high quality and highly competitive mainland Ph.D. or dual degree) programs with a neuroscience emphasis and enhance their likeliness of their success in the program. Central to this is the need to 1) identify talented students with potential for Ph.D studies in neuroscience; 2) introduce them to career opportunities in neuroscience; 3) provide research training and individual mentoring; 4) increase their competitiveness for graduate study; 5) and provide additional professional development activities. It entails established partnerships between MSU and 4 minority serving institutions (MSIs): two campuses in Puerto Rico in the University of Puerto Rico (UPR) system (UPR-Cayey and UPR-Arecibo), as well as two MSIs in the Southwest (Northern New Mexico College and St. Mary's University).

To introduce students to neuroscience, a day-long workshop entitled, "What is Neuroscience?" will be held annually on each of the partnering campuses. To sustain student interest in neuroscience, a two semester videoconference journal club will be held at MSU and broadcast live to the 4 MSIs. Six URM students annually from the four MSIs will spend the fall semester between their 3rd and 5th yrs at MSU taking 9 credits of classwork and continuing on an original, hypothesis-based research project. Included will be a seminar-type course stressing translational and interdisciplinary approaches to understanding the etiology of human disease. This course will entail significant practice in writing, as well as an integral journal club. Improvement of communication skills will involve both informal and more formalized settings (research presentations, participation in class, journal club participation and paper writing).

This program will increase the number of URM students entering Ph.D programs in Neuro-/Behavioral Science, by 1) increasing the student's awareness for research career opportunities in neuroscience, 2) improving their English language skills, 3) providing high quality mentored research experience during the undergraduate studies to 'springboard" the student into the Ph.D program, and 4) providing further didactic training in neuroscience principles, scientific writing and career enrichment activities. Through these combined activities, the student will become more confident in the application process, present a more competitive application and make valuable contacts (network) with researchers at MSU and elsewhere.

Additional Program Team Members:

Dr. Brian Mavis – Co-Investigator, Michigan State University
Ms. Shari Stockmeyer – Program Coordinator, Michigan State University
Dr. Robert Ross – University of Puerto Rico - Cayey
Dr. Hirohito Torres – University of Puerto Rico – Arecibo
Dr. Ulises M. Ricoy – Northern New Mexico College
Dr. Timothy D. Raabe – St. Mary's University

ENDURE TRAINEE ABSTRACT

ABNEIL D. ALICEA PAUNETO

Home Institution and State: **University of Puerto Rico- Cayey**
Email: **abneil.alicea1@upr.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Chemistry, May 2019**
Mentors/Advisors at Home Institution: **Dr. Ross**

ENDURE Trainee Scientific Interest:

I am interested in neuropharmacology and toxicology because it is a science field growing very fast in a very short lapse of time and is improving a lot. The discipline is providing information about how the nervous system works, and it can do it in a very interdisciplinary way. Becoming an expert in the field will give me the necessary tools to fulfill my desire of helping others.

ENDURE Trainee Career Goals and Plan:

My long-term career goals are to work in the academia or industry by leading my research laboratory in the area of neuropharmacology and toxicology. To reach this aim, I will continue graduate studies. The immediate plans are to acquire a vast research experience in fields related to pharmacology and toxicology or neuroscience and to obtain a good GRE score to be a competitive student and get into graduate school.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Michigan State University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. J. Galligan, Dr. W. Atchison**

ENDURE Research Project Title: **Sex Differences in Drug Responses in the Colon of WT and TpH-1 KO Mice**

The enteric nervous system (ENS) is a complex and independent network embedded in the gut walls that controls autonomous gastrointestinal function from the direct connections with the central nervous system. Understanding the ENS physiology will help us develop better approaches to counter attack diseases as Irritable Bowel Syndrome (IBS), a chronic gastrointestinal disease. The present study seeks to identify sex differences in wild-type mice treated with BETH, 5-HT, and ACh, in mouse colon, this to further expand our knowledge of gut physiology and the etiology of IBS. Our experimental procedure consists of comparing, male and female colon motor reflexes by isometric tension isolated organ bath and fecal output assay. For comparison, we will also study tryptophan hydroxylase 1 (the enzyme that synthesized 5-HT) KO mice sex differences, during different drug treatments. As a result, sex does not affect in vitro drug reactivity in the colon of male and female mice and Male TpH-1 KO mice showed intestinal dysmotility compared to female TpH-1 KO mice. These results suggest that a decrease in 5-HT synthesis in the male by EC cells leads to increase in fecal output.

ENDURE TRAINEE ABSTRACT

ARIANA CAMPOS

Home Institution and State: **Michigan State University**
Email: **cariana.noel@gmail.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date**: Chemistry, 2019**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

Although I have not one specific interest in scientific research because I want to explore as much as I can to determine where I want my career to end up, at this moment I am keenly interested neuroscience and the way drugs affect the brain and nervous system in regards to drug addiction and abuse.

ENDURE Trainee Career Goals and Plan:

After attaining my bachelor's degree in chemistry I plan to go on to pharmacy school to earn my PharmD/PhD. I want to be able to make a difference in my community and work with them hands on, yet without having to give up my work as a scientist. Therefore, finding the perfect blend of both aspects is my career goal and plan.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Glasgow**

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title: **Caenorhabditis elegans as a Model Organism for Human Disease**

Caenorhabditis elegans (C. elegans) have 38% protein coding genes which correspond to functional orthologs in humans making for an excellent model to study human conditions. C. elegans' life cycle progresses through 4 larval stages (L1-L4) and feed off of the bacterial (E. coli) strain OP50. Wildtype (WT) nematodes utilize chemosensation and generate a sine wave movement. Mutants may either have a decrease or increase in chemosensation as well as alterations in locomotor genes, one such is the roller phenotype. Generation of point mutations or chromosomal rearrangements with ethyl methane sulfate (EMS) mutagenesis technique produced roller phenotype mutants. Food behavioral assays in the absence or presence of a 0.1M copper sulphate strip (naturally repels WT C. elegans) were performed to assess if mutants had impaired locomotion. Absence of the strip resulted in 100% of the WT nematodes but only 66% of the mutants to move towards the OP50. Presence of the strip produced 50% of WT nematodes movement towards the OP50 in twice the amount of time vs in the strip's absence, and the mutants did not move. These findings suggest that following EMS at least one of the WT C. elegans locomotor genes was mutated causing the roller phenotype characteristic.

ENDURE TRAINEE ABSTRACT

DARLYN CARABALLO

Home Institution and State: **Michigan State University**
Email: **darlyn.caraballo@upr.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Medical Microbiology, May 2017**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I'm interested in understanding the mechanisms that underlie changes in different brain regions DA neuron signaling, morphology, and activity induced in neuropsychiatric disorders such as depression and addiction. Two of the more prevalent psychiatric disorders, that affect millions of adults, and current therapeutic options offer limited relief. Despite the prevalence of these disorders, little is known about their underlying mechanisms.

ENDURE Trainee Career Goals and Plan:

My career goal and plan after completing my Bachelor's Degree in Medical Microbiology at the University of Puerto Rico at Arecibo is to continue my education in the field of Neuroscience and pursue a Ph.D. I aspire to work directly with the people that suffer from psychiatric disorders such as depression and addiction. This two disorders had caught my interest because both affect millions of adults, and current therapeutic options offer limited relief. Ideally, I will combine my clinical inclination with my desire to conduct research.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Michigan State University**

Mentors/Advisors at ENDURE Summer Research Experience Institution**: Dr. Michelle Mazei Robison and Megan Kechner**

ENDURE Research Project Title: **Induction of FosB Following Physical and Emotional Stress**

Depression is a devastating disease and the underlying cellular mechanisms are not well understood. To study this, physical (PS) and emotional (ES) chronic social defeat stress mouse models of depression were utilized. ES has been shown to produce many of the same depressive-like behaviors as PS, but it is currently unknown whether it induces cellular changes similar to those induced by PS, such as induction of the transcription factor ΔFosB. With this in mind, this project seeks to determine if the induction pattern of ΔFosB is similar between PS and ES. Adult c57BL/6J male mice were exposed to either daily PS or ES for 10 days. PS mice were placed into the cage of a CD-1 aggressor mouse, and ES mice were placed into the same cage, but physically separated from the CD-1 and PS mouse by a perforated Plexiglas partition. One hour following social interaction testing on day 11, mice were perfused and brains were post-fixed and cryoprotected. Brains were then sectioned and immunohistochemistry was performed for ΔFosB. FosB-positive cells were counted in multiple brain regions including nucleus accumbens, caudate putamen, dorsal and ventral hippocampus, prefrontal cortex and ventral tegmental area. Interestingly, while ΔFosB was similarly induced by PS and ES in some brain regions such as the hippocampus, in other regions such as the prefrontal cortex, only PS increased ΔFosB expression. This work suggests that different types of chronic stress might produce distinct patterns of ΔFosB induction, potentially indicating different brain circuits mediate these phenotypes.

ENDURE TRAINEE ABSTRACT

YOLIMAR COLÓN LÓPEZ

Home Institution and State: **Pontifical Catholic University in Ponce, Puerto Rico**
Email: **y.colon94@yahoo.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Chemistry, May 2017**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interests:

My interest for research in neuroscience and toxicology started at an early age in my life when my cousin started having serious health difficulties. For years, doctors performed various muscular and genetic tests trying to determine a cause of her illness. The only plausible results came from neurological tests that showed childhood-onset cerebellar atrophy, but no explanations were given. Without realizing it, a desire of acquiring scientific knowledge through research grew in me to help people. I understood how much more still remains to be discovered.

ENDURE Trainee Career Goals and Plan:

My main focus is problem solving, utilizing basic science research as my pathway to subsequently my intentions is to obtain a double PhD in Neuroscience and Pharmacology & Toxicology. Through my undergraduate studies in Chemistry and Biology I have acquired a rich and unique knowledge base. I have learned that both fields are essential in healthcare related basic science research. During my studies I have seen the correlating importance of the human brain in relation to chemical and environmental variables. Research surpasses frontiers in human knowledge, which are still so limited today.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Michigan State University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Rosa Jaiman, Dr. William D. Atchison**

Research Project Title: **MeHg- Induced Cytotoxicity thought Mitochondria and SER in Primary Cerebellar Astrocytes Culture**

Methylmercury (MeHg) is a neurotoxicant that primarily affects granule cells in the cerebellum. This toxicant produces an increase in internal Ca2+ concentration ([Ca2+]i) causing neuron death. Previous studies suggest that astrocytes are targeted by MeHg before neurons. Similarly to neurons, intracellular Ca2+ release can occur in astrocytes. The effects of MeHg in the smooth endoplasmic reticulum (SER) and in the mitochondria of astrocytes have never been studied. The aim of this project was to study the effect of MeHg in the SER and the mitochondria, and its relationship with cerebellar astrocytes cytotoxicity. Primary astrocyte cultures from the cerebellum of 7-8 day old C57BL/6 mice were exposed for 3h to 0, 1, 2, or 5μM MeHg. Cytotoxicity was measured 24h after MeHg exposure using ethidium homodimer and calcein-AM. To determine if astrocyte death was due to an increase in [Ca2+]i from SER and mitochondria, both thapsigargin and carbonyl cyanidem-chlorophenylhydrazone were used respectively. It was hypothesized that MeHg affects the SER and mitochondria in cerebellar astrocytes producing cell death. Determining the relationship between MeHg-induced disruptions of [Ca2+]i with cell death could help us understand the mechanisms of MeHg-toxicity in cerebellar astrocytes. Supported by ENDURE grant NIH R25 NS090989 and Society of Toxicology.

ENDURE TRAINEE ABSTRACT

CARINA GUERRA

Home Institution and State: **University of North Carolina at Chapel Hill, NC**
Email: **carina@live.unc.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **B.S. Psychology, Minors in Chemistry and Neuroscience**
Mentors/Advisors at Home Institution):

ENDURE Trainee Scientific Interests:

I am thoroughly interested in neuroscience research especially having to do with neurological disorders and disease. I would eventually like to better understand the mechanisms that underlie affective and psychotic disorders including schizophrenia, anxiety, depression, and bipolar. I am also very interested in current research involving criminal psychopathy and the neurological components of psychopathic behavior. My goal is to understand these neurological phenomena in order to be able to find various treatment options and eventually treat patients with these disorders.

ENDURE Trainee Career Goals and Plan:

I am currently still deciding whether I will be pursuing a dual PhD/ MD program in clinical neuroscience or going to medical school for an MD to pursue neurology or psychiatry in medicine. In either case I aspire to work with patients in order to help treat a variety of neurological disorders and disease, whether that may be some form of psychosis or the progression of a neurodegenerative disease such as ALS. More specifically, I aspire to specialize in psychotic and affective disorders.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Michigan State University**

Mentors/Advisors at ENDURE Summer Research Experience Institution): **Dr. William Atchison**

Research Project Title: **The Effects of Methyl Mercury on Reactive Oxygen Species Generation and on the Nrf2-ARE Antioxidant Pathway in NSC34 Cells**

Methylmercury (MeHg) is an environmental toxicant that induces cell death and causes long-lasting neurological deficits in humans and animals. MeHg has been known to cause oxidative damage by increasing reactive oxygen species (ROS) levels in the cerebral cortex of rats and to activate the nuclear factor erythroid 2-related factor 2 (Nrf2)- antioxidant response element (ARE) pathway in astrocytes and microglia. The Nrf2-ARE pathway is involved in antioxidant defenses that help combat the oxidative stress (OS) caused by ROS. High levels of OS have been linked to neural degeneration; therefore their regulation is critical to cell survival. The following work seeks to determine the mechanism under which MeHg induces degeneration in motor-neuron-like cells called NSC34 and whether it involves a disruption in the redox homeostasis. In order to test this, ROS levels were measured with flow cytometry, while Nrf2-ARE pathway activity was measured using qPCR. There was a significant increase in ROS production at 5 μM MeHg and no significant increase in Nrf2-ARE pathway activity with MeHg exposure. Future research could further investigate Nrf2-ARE activity by measuring other downstream antioxidant genes at different time points.

ENDURE TRAINEE ABSTRACT

KARINA MATOS

Home Institution and State: **University of Puerto Rico-Ponce**
Email: **karina.matos@upr.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology and Mental Health/2018**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I have a deep love and interest for cellular-molecular neuroscience. I want to study the molecular basis of neurodegenerative diseases, such as Parkinson's disease, and also inflammatory diseases, such as Inflammatory Bowel Disease.

ENDURE Trainee Career Goals and Plan:

After finishing the semester at Michigan State University, I will get back to a voluntary research position at Ponce Research Institute at Ponce Health Sciences University and School of Medicine. I will finish the biology minor I began this year; and after the two years I have left I will have an enriched research experience that will allow me to enter to a Ph.D. program.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Michigan State University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Zachary Grieb, and Dr. Joe Lonstein**

ENDURE Research Project Title: **Corticotropin-releasing hormone signaling in the dorsal raphe across reproductive states**

While motherhood is often associated with elevated mood, many postpartum women experience emotional dysregulation, especially elevated anxiety. Postpartum anxiety is particularly damaging because it perpetuates across generations, with children of anxious parents 5-7 times more likely to be diagnosed with an anxiety disorder than their general counterparts. Therefore, understanding the underlying neurobiology of postpartum anxiety is critical because it has adverse and long-term effects on children. Corticotropin-releasing hormone (CRH) is a neuropeptide involved in stress-related physiology. CRH causes these effects in part by modulating serotonergic systems that mediate socioemotional regulation, such as that found in the dorsal raphe (DR), which provides most of the forebrain serotonin. We are focusing in the dorsal raphe (DR), which provides most of the forebrain serotonin. There are two known CRH receptors, CRHR1 and CRHR2, that have opposing effects on anxiety-like behaviors, with DR CRHR1 activation anxiogenic and DR CRHR2 activation anxiolytic. Therefore, we first hypothesize that the number of CRH cells in the brain will be lower in dams showing less anxiety-like behaviors. To test this we will use immunohistochemistry to examine the relationship between the number of CRH cells and the anxiety-like behavior of postpartum rats. Additionally, we also hypothesize that DR levels of CRHR1 mRNA will be decreased, while CRHR2 mRNA will be increased, in postpartum dams compared to diestrous virgins. To test this hypothesis we will perform RT-PCR to quantify CRHR1/2 mRNAs expression in the DR across reproductive states. Current analysis of CRH cells is in preliminary trials prior full-scale operation. Results from CRHR1/2 mRNA analysis showed a significant ascending difference of CRHR2 across reproductive state, but not for CRHR1. This implies that CRHR2 it may play a role in reducing anxiety during the early postpartum period.

ENDURE TRAINEE ABSTRACT

JARIEL RAMIREZ

Home Institution and State: **University of Puerto Rico, Cayey**
Email: **jarielramirez@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology, 2019**
Mentors/Advisors at Home Institution: **Dr. Yan Levitsky, Dr. Julia Busik, Dr. Denis Proshlyakov**

ENDURE Trainee Scientific Interest:

I have been introduced to bioinformatics, cell-culture, animal studies, amongst other fields and have been able to disqualify many fields and topics I would pursue, as well as research lifestyles. Currently I work with studies using animal models, analyzing mitochondria from tissues, and I truly enjoy all aspects of the project and see myself pursuing neurological studies targeting the mitochondria as the approach to treat or cure significant diseases. My biggest interest in research is related to what I work on since it sparked immensely my interest, but I still am open-minded to other options that may arise.

ENDURE Trainee Career Goals and Plan:

Currently I am an undergraduate student obtaining my BS degree in Michigan State University for this semester with the Bridge to PhD in Neuroscience Program. I plan to attend graduate school to obtain a PhD, yet remain undecided as to the specific field(s) to apply. Nonetheless, neuroscience is a discipline that allows integration of multiple scientific areas as well as perspectives, thus a very open field for exploration; in addition, the nervous system's complexity continuously piques my interest and intrigues me to know more of the field.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Michigan State University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. William D. Atchison**

ENDURE Research Project Title: **The importance of Acid Sphingomyelinase in mitochondria from mouse liver**

Mitochondria are the essence of eukaryotic life and, as studies suggest, reason for many diseases affecting humanity, including diabetes-related illnesses. Our previous studies have demonstrated that upregulation of the central enzyme of sphingolipid metabolism, Acid Sphingomyelinase (ASM), converting sphingomyelin to ceramide, critically contributes to retinal inflammation and endothelial cell apoptosis in diabetic retinopathy. Recent studies established an important connection between ceramide in the mitochondrial membrane and mitochondrial function, as well as inflammation and apoptosis. This study aims to determine the role of ASM upregulation and ceramide production in mitochondrial function. Wild type control and ASM-/- mice were used in this study. Mitochondria were isolated by differential centrifugation and mitochondrial activity was measured using NeoFox fluorescent oxygen sensor. Mitochondrial tests were normalized to 2mg/ml final concentration and activity without induced diseases show no difference between wild-type and ASM-/-. LPS induced inflammation affected severely the mitochondria, suggesting other methods of inducing inflammation. Decreasing ceramide levels in the mitochondria through ASM inhibition should help improve mitochondrial function and protect cells from mitochondrial damage in DR. Future work will focus on elucidating the mechanistic implications of ASM activity on mitochondrial function in metabolic disease.

ENDURE TRAINEE ABSTRACT

GRETCHEN RIVERA

Home Institution and State: **University of Puerto Rico, Humacao**
Email: **gretchen.rivera11@upr.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology, 2017**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

My research consists of localizing neurokinin receptors (NKR) receptors to see if they are involved in neuro-glial communication and to better understand the role of NKR activation on glial cells.

ENDURE Trainee Career Goals and Plan:

I aspire to study an MD MPH. Later on, I would like to specialize in psychiatry.

ENDURE Trainee Summer Research Experience:

ENDURE Summer **Research Experience Institution: Michigan State University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. William Atchison**

ENDURE Research Project Title: **Localization of Tachykinin Receptors in Mouse Colon and Human Jejunum**

Irritable Bowel Syndrome (IBS) is a multifactorial gastrointestinal disease caused by alterations in the Enteric Nervous System (ENS). However, the role of enteric glial cells (EGC) in this disease state is still unknown. As such, we wanted to see if tachykinins (TKs) are involved in glial changes during IBS. TKs act as neurotransmitters in the central and peripheral nervous system to provide a link for bi-directional interactions between EGC and neurons. The binding of neurokinin receptors (NKR) is responsible for the regulation of motility in the ENS. The purpose of this study was to localize NKR to EGC a to better understand the role of NKR activation on glial cells. To localize expression on EGC, we used fixed mouse colon preparations and performed immunohistochemistry to identify different NKR subtypes. Our preliminary data suggests that NK2R, a specific NKR subtype, is expressed on EGC, suggesting a role of TKs in neuron-glial communication. Furthermore, the data suggest that NK1R and NK3R subtypes are not expressed in EGC. Our results suggest that NKR expression is region specific and thus co-localization of NK2R and enteric glial cells in the human colon is still to be determined. This research was supported by NIH ENDURE grant.

ENDURE TRAINEE ABSTRACT

KIMBERLEY RIVERA-CARABALLO

Home Institution and State: **University of Puerto Rico at Humacao**
Email: **riverac8@msu.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **May 1, 2019**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I had the opportunity of doing research during the summer of 2015 at Michigan State University with Dr. Kaminski, wherein we characterized the Interleukin-1 receptor knockout rat for use as a model for an ongoing research to identify the role of inflammation in TCDD-mediated hepatotoxicity. In my hometown institution, we study the role of tumorhead protein during the embryological development of *Xenopus laevis*. During the fall of 2016 I was part of Dr. Atchison's Bridge to the Ph.D. in Neuroscience Program in which I compared the susceptibility to methylmercury between spinal cord astrocytes and motor neuron-like cells.

ENDURE Trainee Career Goals and Plan:

A must for my future career is being able to help others. Majoring in microbiology, I immediately developed an inclination to study diseases and the immune system. Previous research experiences led me to see science with different eyes: as wide-ranging, integrative and diverse. On my journey towards a Ph.D. in toxicology, I realized that studying environmental factors that affect the immune system is a perfect way to apply microbiology and toxicology knowledge to understand diseases.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Michigan State University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. William Atchison**

ENDURE Research Project Title: **The susceptibility of spinal cord motor neuron cell line (NSC 34) and spinal cord astrocytes during methyl mercury exposure**

The type and severity of neurotoxicity of methylmercury (MeHg) varies depending on the brain region and cell type. In this study, we compared the susceptibility of spinal cord motor neurons cell line, NSC34 cells with spinal cord astrocytes (SCA) to MeHg (0, 1, 2 and 5 uM) from 0 to 48 h using real time cytotoxicity assay to measure cell metabolic activity. Two-way ANOVA results indicated that MeHg affects both cell types in a concentration- and time-dependent manner. The onset of the metabolic reduction in NSC34 and SCA cells depends upon MeHg concentration. The onset of the metabolic reduction appears at 24h, 18h and 15h when NSC34 cells exposed to 1, 2 and 5uM MeHg, respectively. On the other hand, the onset of the metabolic reduction in SCA appears sooner than that in NSC34 cells. The onset of the metabolic reduction significantly appeared at 24h during 1 uM MeHg exposure and at 2 h during 2 uM and 5 uM MeHg exposures. The differential onset of the metabolic reduction between these two cell types suggests that differential susceptibility to MeHg occurs in spinal cord; the SCA cultures are more susceptible to MeHg than NSC34 cells.

ENDURE TRAINEE ABSTRACT

SIMON SANCHEZ

Home Institution and State: **St. Mary's University**
Email: **swolfsanchez@outlook.com**
Undergraduate Academic Level: **Sophomore**
Undergraduate Major and Expected Graduation Date: **Biophysics May 2018**
Mentors/Advisors at Home Institution: **Dr. Ahmad Galaleldeen**

ENDURE Trainee Scientific Interest:

I am interested in studying neuroscience and doing research on mental illnesses like Alzheimer's and Parkinson's disease. I want to learn and understand more about these illnesses and hope to get closer to finding a cure.

ENDURE Trainee Career Goals and Plan:

After obtaining my Bachelor's degree in Biophysics from St. Mary's University, I aspire to continue my education in a graduate degree program and to conduct research on a professional level with the goal of obtaining my PhD. in Neuroscience.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution**: Michigan State University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Romana Jarosova, Dr. Greg M. Swain**

ENDURE Research Project Title: **Electrochemical detection of isatin using flow injection analysis with amperometric detection.**

Isatin is a compound that has been shown to have a wide range of biological activities. Isatin is found endogenously in humans and rodents. In rat models, isatin concentrations have been shown to increase with stress in the heart, brain, blood plasma, and urinary samples. Isatin is electrochemically active and can be detected with electrochemical techniques. Of these techniques, flow injection analysis is a versatile technique used for the determination of easily oxidizable or reducible analytes. The performance of a nitrogen-incorporated tetrahedral amorphous carbon electrode and a boron-doped diamond electrode was evaluated using flow injection analysis with amperometric detection. The borondoped diamond electrode is known for its excellent properties such as a low stable background current, weak molecular absorption, and microstructural stability, but has a high deposition temperature required for growth, (600-800 oC). Similarly, the ta-C:N electrode has been shown to exhibit many of the same attractive properties of the boron-doped diamond electrode with the advantage of a low deposition temperature near room temperature (25-100 oC). The analytical detection figures of merit such as the response precision, sensitivity, linear dynamic range and limit of detection for isatin in a 0.1 M phosphate buffer (pH 7.2) were determined for both electrodes.

ENDURE TRAINEE ABSTRACT

JESICA VICENTE-REYES

Home Institution and State: **University of Puerto Rico at Cayey, Puerto Rico**
Email: **jesica.vicente@upr.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology, May 2017**
Mentors/Advisors at Home Institution: **Dr. Ricardo Chiesa**

ENDURE Trainee Scientific Interest:

I'm interested in exploring the brain, especially how the vessels are affected in cerebral circulation and how this can be prevented.

ENDURE Trainee Career Goals and Plan:

I want to start a master in Puerto Rico next year and then continue my studies in the USA.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Michigan State University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr.William Atchison, Anne Dorrance**

ENDURE Research Project Title: **The effects of the mineralocorticoid receptor in basilar atrtery TRPA1 channel expression in hypertensive mice**

Hypertension impairs artery vasodilation, increasing the stroke risk. Mineralocorticoid receptor (MR) blockade prevents endothelial dysfunction. The calcium channels are activated by intracellular calcium or calcium influx through transient receptor potential (TRP) channels including TRPA1. How MR activation alters these channels and vasodilation in cerebral arteries is unknown. Impairments in basilar artery can lead to reduced cerebral perfusion. We hypothesize that angiotensin II (AngII) hypertension will decrease TRPA1 channel expression causing impaired endothelium-dependent dilation in the basilar artery. MR antagonism with eplerenone (EPL) will prevent the changes in channel expression. To induce hypertension, 16-week-old male C57Bl/6 mice were treated with AngII (800ng/kg/min) subcutaneously for 4 weeks via osmotic minipumps. To test the role of the MR a group of mice were treated with EPL (100mg/kg/day) during the 4 weeks of the AngII infusion. At 20 weeks mice were euthanized and brain was collected to immunolabel TRPA1 channels in the basilar artery. AngII increased blood pressure and the MR antagonism did not change this. The adrenal flow did not change with AngII treatment but cardiac hypertrophy was observed. The TRPA1 channel was found in the endothelial cells of the basilar arteries as expected but the statistical analysis of expression was not performed.

ENDURE TRAINEE ABSTRACT

ANTONIO WHITE

Home Institution and State: **North Carolina Central University**
Email: **awhite81@eagles.nccu.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Pharmaceutical Sciences and Chemistry May 2018**
Mentors/Advisors at Home Institution**: Dr. Tonya Gerald Goins, Dr. Gail Hollowell, Dr. Antonio Baines**

ENDURE Trainee Scientific Interest:

I am interested in toxicological research. I would like to get involved more in neuroscientific toxicology research.

ENDURE Trainee Career Goals and Plan:

I will finish undergraduate school and attend graduate school to obtain a PhD in Toxicology. I plan to conduct research for many years and in my later years, open up my own pharmacy.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Michigan State University**

Mentors/Advisors at ENDURE Summer Research Experience Institution**: Dr. James Galligan, Dr. Bill Atchison, Jose Suarez**

ENDURE Research Project Title: **Sex Difference of the Enteric Nervous system of Mice**

This research project was conducted over an eight week period. The project looked at the enteric nervous system of mice to analyze whether or not sex plays a role in gut function. Two experiments which was conducted were an isometric organ bath and a fecal output assay. In the isometric organ bath experiment, results shows no sex differences in the bethanechol and 5-hydroxytryptamine (5-HT) dose response curve but in the acetylcholine dose response curve, there was a significant difference at 1 concentration. In the fecal output assay, there was a significant difference among one of the mice models.

BP-ENDURE ST. LOUIS: A NEUROSCIENCE PIPELINE

WASHINGTON UNIVERSITY IN ST. LOUIS
Principal Investigator: *Dr. Erik Herzog*
Partner Institutions: University of Missouri – St. Louis and Harris-Stowe State University

PROGRAM DESCRIPTION:
The objective of the program is to provide rigorous and critical training in neuroscience to a diverse cohort of students from three partner institutions (Washington University, the University of Missouri-St. Louis and Harris-Stowe State University). By providing support for 10 funded positions for summer research, this proposal will establish a Pipeline to graduate school. The Pipeline emphasizes sustained training in oral and written science communication, discovery science and outreach experience. Specifically, this proposal will support 10 early-stage trainees annually for up to three years each. Our Pipeline has long-standing commitments to cutting-edge research, to interdisciplinary education, and to providing modern career development.

We seek to be a Program that responds to changes in the research environment by helping our students to pursue important and innovative problems and concepts, to adopt new techniques and to communicate effectively with their peers and the general public. The proposal will allow for the addition of three interactive and immersive courses that will appeal to teens and create a community of young scientists who can begin as early as the summer after their freshman year. The curriculum and research environments will remain broad and deep, combining expertise in molecular, cellular and systems-level approaches to the study of neural function and dysfunction.

Major new initiatives aimed at accomplishing these goals include: 1) the establishment of a new network of research opportunities for undergraduates interested in the neurosciences, 2) the introduction of three interactive courses (The Teen Brain, Neuroscience Futures, and Skills for a Neuroscientist) to bolster neuroscience fundamentals and a sense of community among the students, 3) enhanced involvement of the undergraduates in the Society for Neuroscience Brain Bee as part of their training in science communication, and 4) refinement of a near peer-mentoring program that has graduate students working with undergraduates and undergraduates working with high school students. These initiatives will ensure our students remain at the forefront of developments in neuroscience research, teaching and outreach.

ADDITIONAL PROGRAM TEAM MEMBERS:

Dr. Sonya Bahar – University of Missouri-St .Louis
Dr. Robert Paul – University of Missouri-St. Louis
Dr. Jana Dorfman Marcette – Harris-Stowe State University
Dr. Diana José-Edwards – Program Coordinator, Washington University
Ms. Rochelle Smith – Program Manager, Washington University

ENDURE TRAINEE ABSTRACT

JOSEPH BRADLEY

Home Institution and State: **Harris-Stowe State University**
Email: **joe.bradley53@yahoo.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **May 1, 2016**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I am interested in investigating the role of genetics in causing and progressing Alzheimer's disease and I would like to use that information to help develop treatments and therapies for the disease

ENDURE Trainee Career Goals and Plan:

I plan to become a physician scientist and use my knowledge and research in genetics to help create a more effective and personalized treatment for patients.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Washington University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Yuetiva Robles-Deming, Dr. Carlos Cruchaga**

ENDURE Research Project Title: **Fine mapping of Genome-Wide Association Study identified loci that are associated with Alzheimer Disease using endophenotypes**

Alzheimer Disease (AD) is the sixth leading cause of death in the United States. There are currently no available cures or effective treatments, and despite the development and improvement of various testing methods, Alzheimer's can only be definitively diagnosed at autopsy. However, the National Institute of Aging has identified 11 loci, in which, mutations may lead to the development of AD. Genetic studies are allowing for a better understanding of the risk and disease modification that underlies AD progression, onset, and other factors of the disease. The Cruchaga Lab uses data from genome wide association studies (GWAS) to identify novel risk variants and genetic loci that are associated with AD risk and other aspects of the disease. This project aims to perform a localized study (fine-mapping) of previously Identified loci using well established AD endophenotypes (causal biomarkers): cerebrospinal fluid (CSF) Amyloid Beta 42 (AB42) and phosphorylated Microtubule Associated Protein Tau (pTau181). This study focused on individuals most similar to those of European descent, characterized by principal component analysis, to control for population specific differences in allele frequency. Regional plots were generated for each of the previously identified loci. Within these regions, a small area was selected, which was believed to contain the functional gene, or genes, causal for AD. Finally, locusspecific analyses were performed to identify single nucleotide polymorphisms (SNPs) within these AD risk loci that were also associated with CSF levels of AB42 or ptau181. These SNPs were investigated for previously reported potential regulatory functions or influence on gene expression to uncover information about Alzheimer risk and disease modification.

ENDURE TRAINEE ABSTRACT

JASMINE BROWN

Home Institution and State: **Washington University in St. Louis**
Email: **jasmine.brown@wustl.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date**: Neuroscience, May 2018**
Mentors/Advisors at Home Institution: **Dr. Robyn Klein, Dr. Erik Herzog**

ENDURE Trainee Scientific Interest:

I am interested in understanding molecular mechanisms in disease models affected the nervous system in the hopes of aiding in the development of therapies that improve the quality of life of individuals affected by these diseases.

ENDURE Trainee Career Goals and Plan:

I plan to pursue a career as a physician-scientist. I hope to start my own lab after I become more experienced. I would also like to practice medicine when I'm not in the lab. My research and medical interests are in the neuroscience field.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Washington University in St. Louis**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Robyn Klein, Dr. Erik Herzog**

ENDURE Research Project Title: **Identifying Protective Genes Against Cognitive Sequelae Following West Nile Mediated Encephalitis**

More than half of patients who survive West Nile neuroinvasive Disease (WNND) exhibit chronic cognitive impairments that resulted from the disease. Previously, the lab discovered that some infected wild type mice also exhibited spatial learning deficits while some did not. These mice were labeled “good learners” and “poor learners”. I used interferon gamma receptor (IFNgR) knockout mice as a model to study the natural mechanism present in the good learners. I hypothesized that alterations in gene expression that are conserved between “good learners” and IFNgR knockout animals following WNV infection would point to a common protective mechanism. To investigate this, I did qPCR, which revealed a significant decrease in the expression of Crry, a complement regulatory gene, in the infected IFNgR knockout mice hippocampi compared to wild type mice. Decreased expression of Crry was also seen in the hippocampi of WNV good learners when compared to the poor learners suggesting that this protein may play a key role in the protective mechanism. Our next step is to investigate what role Crry plays in this mechanism. Determining the details of this protective mechanism could lead to therapies for people experiencing cognitive deficits following WNV infection.

ENDURE TRAINEE ABSTRACT

ALEXANDER CONWAY

Home Institution and State: **Saint Louis University**
Email: **alexpconway@gmail.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Neuroscience, 2018**
Mentors/Advisors at Home Institution: **Dr. Yuna Ayala, Dr. Paul Bracher**

ENDURE Trainee Scientific Interest:

Molecular Neuroscience, Neurodegenerative Diseases

ENDURE Trainee Career Goals and Plan:

I plan to attend a graduate degree program and use my training in science to bridge the gap between science and business.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Icahn School of Medicine at Mount Sin**ai

Mentors/Advisors at ENDURE Summer Research Experience Institution**: Dr. George Huntley, Dr. Deanna Benson**

ENDURE Research Project Title: **Parkinson's disease-linked LRRK2-G2019S mutation changes morphology of spiny projection neurons in nucleus accumbens**

Mutations in the gene that encodes leucine rich repeat kinase 2 (LRRK2) are the most common cause of heritable Parkinson's disease (PD). The most prevalent of these mutations, LRRK2-G2019S, confers a gain-of-kinase function to the protein and has been shown to disrupt dorsal striatal glutamatergic synaptic activity during development. Beyond the dorsal striatum, LRRK2 expression is enriched in ventral striatal spiny projection neurons (SPNs), and PD patients often exhibit non-motor symptoms regulated by ventral striatal circuits, including depression and anxiety. Thus, we hypothesized that LRRK2 is involved in ventral striatal synaptic development and function and, further, that disruptions caused by G2019S will alter synapses. To test this, we used a mouse model expressing a knock-in LRRK2G2019S mutation (GSKI) to examine ventral striatal glutamatergic synaptic transmission and postsynaptic structure. Whole cell voltage-clamp recordings of GSKI spontaneous excitatory postsynaptic currents (sEPSC) in SPNs in the nucleus accumbens (NAc) showed a significant increase in amplitude compared to wild type. Subsequent analysis of biocytin-filled dendrites showed a slight but significant increase in GSKI spine head diameter. This data supports that LRRK2 has a post-synaptic role in ventral striatal circuit development and that G2019S alters glutamatergic synaptic structure and function at early postnatal ages. Lastly, this data suggests that such disruptions may contribute to early non-motor symptoms in PD patients.

ENDURE TRAINEE ABSTRACT

YA'EL COURTNEY

Home Institution and State: **Kent State University**
Email: **ycourtne@kent.edu**
Undergraduate Academic Level: **Sophomore**
Undergraduate Major and Expected Graduation Date: **Biochemistry/Psychology**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

My research, in collaboration with the Cognitive Control and Psychopathology lab at Washington University in St. Louis, focuses on utilizing neuroimaging techniques and analyses to differentiate neural substrates utilized when processing reward vs. punishment motivations.

ENDURE Trainee Career Goals and Plan:

After graduating with a BS in Biochemistry and a BS in Psychology, I intend to pursue a PhD in neuroscience and am tremendously excited to continue in a life of research work.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Washington University in St. Louis**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Todd Braver, Dr. Jo Etzel, Debbie Yee, Dr. Diana Jose-Edwards, Dr. Erik Herzog.**

ENDURE Research Project Title: Reward vs. Punishment: **An fMRI Analysis Approach to Identifying the Neural Substrates of Motivation and Cognitive Control**

Every day, humans face the complex cost-benefit analysis of integrating incentives to pursue behavioral goals. Impairments in cognitive control (particularly an abnormal response to motivation) underlie disorders such as schizophrenia, depression, and addictions; as such it is important to illustrate how differing motivational cues are processed in healthy humans. Research has made great progress in discovering the behavioral and neural mechanisms that underlie motivation and cognitive control. However, a significant question that remains to be addressed is whether rewards and punishments utilize the same or different neural substrates to yield motivational effects. In the current study, participants performed a cued-task switching paradigm during two fMRI scanning sessions, with liquid incentives serving as either a reward for desirable performance or a punishment for failure to complete the task quickly and accurately. Both incentives resulted in comparable behavioral task performance, but a standard preprocessing pipeline followed by GLM contrast analysis revealed several regions of interest that appear to be distinct between the conditions. Results suggesting the utilization of different neural substrates give reason to apply the more sensitive Multi-Voxel Pattern Analysis approach to clarify and support these findings in the future.

ENDURE TRAINEE ABSTRACT

DAVINELLE DANIELS

Home Institution and State: **Washington University in St. Louis**
Email: **davinelly@gmail.com**
Undergraduate Academic Level: **Graduate**
Undergraduate Major and Expected Graduation Date: **Biology - 2015**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I am broadly interested in metabolic deregulation that drives cancer phenotypes.

ENDURE Trainee Career Goals and Plan:

I plan to work as a post-doctoral fellow then pursue a career in industry.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Washington University in St. Louis**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Brian Van Tine**

ENDURE Research Project Title: **Induction of permeability transition pore opening for the activation of apoptosis in malignant peripheral nerve sheath tumors**

Metabolic enzymes crosstalk between apoptotic mechanisms and the ability of cells to retain glucose within the cells, one key molecule involved in this correlative mechanism is hexokinase II (HKII). The essential and irreversible first step of glycolysis that phosphorylates glucose to glucose-6-phosphate is catalyzed by the localization of hexokinases at the inner plasma membrane, while is an integral component of PTP transition when bound to the mitochondrial membrane. The known molecular interaction that facilitates PTP opening is initiated with the phosphorylation of HK II bound VDAC at the outer mitochondrial membrane, causing the displacement of HK II. Active GSK-3 is now able to induce PTP opening through its role in CyP-D phosphorylation; the final mitochondrial manipulative factor that drives PTP opening (Chiara 2013). Aerobic glycolysis is preferred in many cancers when compared to normal tissues. Uniquely, our preliminary findings characterized MPNSTs to possess an OXPHOS phenotype over the expected Warburgian phenotype. This allows for the targeting of electron transport chain components within OXPHOS to induce PTP opening for treatment of this elusive phenotype observed in MPNSTs. We hypothesize that by exploiting MPNSTs preference for OXPHOS by using a complex I inhibitor, AUL12, will induce rapid cell death by initiating the opening of the PTP.

ENDURE TRAINEE ABSTRACT

MARIA GONZALEZ

Home Institution and State: **University of Puerto Rico at Cayey, Puerto Rico**
Email: **maria.gonzalez66@upr.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **BS, Natural Sciences / 2018**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

During my undergraduate years I have felt very interested in the study of cancer in the nervous system. I have also felt interested in the molecular mechanisms, something very microscopic, that have important effects in our health. For example, I feel interested in how the expression of certain proteins can affect the tumorigenic phenotypes of cancer cells in our body.

ENDURE Trainee Career Goals and Plan:

Knowing my interest in the neuroscience field, my academic goal is to obtain an undergraduate degree in Natural Sciences, to then obtain an MD/PhD in Neuroscience or Cancer biology. Subsequently, my career goal is to work in a laboratory where I can develop investigations that contribute to the scientific field and that somehow help humanity.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Washington University in St. Louis**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Joshua Rubin**

ENDURE Research Project Title: **Sexual Dimorphisms in Cellular Responses to the Chemokine CXCL12 in Glioblastoma**

Glioblastoma (GBM) is the most malignant brain tumor. Previous studies have shown that GBM occurs more frequently in men than women, and that men have worst outcomes regardless of age, race, and environment. However, the role of sex in the development of GBM is poorly understood.

A better understanding of the molecular mechanisms that underlie sex differences is a major challenge in developing personalized treatments for patients. Using a murine model of mesenchymal GBM (mesGBM) our lab has shown that males exhibit greater growth, higher proliferation and increased tumorigenesis. One possible explanation for these sex differences is the differential activation of the CXCR4 pathway. CXCR4 is a GPCR that is overexpressed in GBM, and is known to mediate proliferative and migratory responses.

This project examined sexual dimorphisms in cellular responses to the chemokine CXCL12, the ligand of the CXCR4 receptor. We hypothesized that the differential activation of this pathway by CXCL12 would lead to differences in growth rates between male and female astrocytes. We measured phosphorylation of target proteins by performing Western Blots, and proliferation by growth assays. The results obtained through this work may provide insights into sexual dimorphisms underlying the expression of CXCR4, thus revealing elements of GBM biology that are still unknown.

ENDURE TRAINEE ABSTRACT

JESSICA JIMENEZ

Home Institution and State: **Oberlin College, Ohio**
Email: **jjimene2@oberlin.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Neuroscience and Biology, 2017**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I am interested in researching the mechanisms underlying the toxicological influence on neurodegenerative disorders. This interest stems from previous work I have been involved with exploring the gene-environment interactions between metal exposures, including manganese and cadmium, and Parkinson's disease and Huntington's disease.

ENDURE Trainee Career Goals and Plan:

Upon graduating from Oberlin College, I hope to pursue a Ph.D. in neurobiology or toxicology. I am interested in a career as a toxicologist, or one that will allow me to advance knowledge on neurodegenerative disorders.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Vanderbilt University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Aaron Bowman**

Research Project Title: **Identifying small molecule-altered cellular manganese regulatory pathways**

Manganese (Mn) plays an essential role in many cellular processes by serving as a cofactor for various enzymatic activities. Not surprisingly, altered Mn biology can have neuropathological consequences, including Mn-induced parkinsonism and Huntington's disease. Beyond several non-selective transporters, and a recently identified Mn efflux transporter, SLC30A10, the cellular signaling network for regulating neuronal Mn homeostasis is poorly understood. Previously, 41 small molecules capable of significantly altering intracellular Mn levels were identified in a high-throughput screen utilizing an immortalized murine striatal neuron lineage. These small molecules have yet to be analyzed in order to gain insight into the Mn regulatory pathways targeted. Thus, using intracellular Mn levels as the outcome measure, we explored the functional epistatic relationship of the small molecules in this neuronal lineage. We also investigated the effects of the small molecules on the SLC30A10 pathway in HeLa cells expressing wild type or mutated SLC30A10. Ultimately, we were able to delineate the most extensive intracellular Mn-altering small molecule pathway generated to date and were able to categorize the small molecules into those that may be targeting the SLC30A10 pathway. This study provides novel insight into Mn trafficking and homeostasis, which should improve understanding of Mndependent functions.

ENDURE TRAINEE ABSTRACT

NECO JOHNSON

Home Institution and State: **San Diego State University, California**
Email: **necoxjohnson@gmail.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Psychology, 2017**
Mentors/Advisors at Home Institution: **Dr. Theresa Cronan, Dr. Claire Murphy, Dr. Robert Heaton, Dr. Maria Marquine**

ENDURE Trainee Scientific Interest:

I am interested in neurocognitive function across the lifespan. I am particularly interested in factors that slow or exacerbate cognitive decline later in life. I also have a growing interest in racial disparities in neurocognitive function. More specifically, I am interested in how genetic and environmental factors might interact to produce disparities in cognitive status.

ENDURE Trainee Career Goals and Plan:

I plan to earn a Ph.D. in clinical psychology with a concentration in neuropsychology. With this degree, I would like to study and assist underprivileged populations at risk of cognitive decline.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Washington University in St. Louis**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Desiree White, Zoe Hawks**

ENDURE Research Project Title: **Developmental Trajectories of Strategic Processing in Children with Phenylketonuria**

Domains Prior research suggests that strategic processing, one such executive domain, is impaired in children with PKU; however, little is known about the developmental trajectory of strategic processing during childhood and adolescence. The present study evaluated strategic processing in 23 children with early-treated PKU and 44 typically developing controls across three time points using a verbal fluency task. Verbal fluency performance was assessed for clustering and switching in two categories: semantic fluency (animal and food/drink) and phonemic fluency (S words and F words). Whereas clustering was defined as a group of 2 or more words with semantic or phonemic congruence, switching was defined as moving from one word or cluster to an unrelated word or cluster. A composite of mean cluster size and switching was examined to analyze strategic processing. Results indicated that participants with PKU exhibited worse use of phonemic fluency strategies than controls and, that older baseline age was associated with more efficient semantic and phonemic strategic processing. Of particular interest, there was a significant interaction between group and time point, such that participants with PKU exhibited worse use of semantic fluency strategies over time than controls. Together, these results suggest that deficits in strategic processing emerge and are exacerbated as children with PKU age.

ENDURE TRAINEE ABSTRACT

JAKE KHOUSSINE

Home Institution and State: **University of Oklahoma, Oklahoma**
Email: **jokhoussine@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Chemical Biosciences, May 2017**
Mentors/Advisors at Home Institution: **Dr. James N. Thompson, Jr, Dr. Douglas D. Gaffin**

ENDURE Trainee Scientific Interest:

I am interested in taking a genomics approach to study developmental neuroscience with an emphasis on translational research. I want to investigate the molecular and genetic mechanisms that prompt the progression of devastating neurological diseases in children, such as autism and epilepsy. I am passionate about this research initiative because I believe that the post-genomic era will establish novel tests for early diagnosis to significantly alter the way in which approach the treatment of such neurodevelopmental disorders.

ENDURE Trainee Career Goals and Plan:

I am currently applying for the Medical Scientist Training Program (MSTP) to pursue the combined degrees of M.D./Ph.D. By training in a multidisciplinary Ph.D. program that supports my interests in developmental biology, genetics, and neuroscience, I plan to develop the critical thinking and patient care skills needed for integrating pediatric neurology with genomic medicine. My career goal is to work at a cutting-edge research institution as an academic physician-scientist.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Washington University School of Medicine**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Aaron DiAntonio, Ms. Alexandra Russo**

ENDURE Research Project Title: **Identifying novel pathways that dictate synaptic growth**

Human brains are composed of sophisticated networks of neurons with the capacity to conduct efficient cell-cell communication. Central to this function is the synapse, which establishes complex arrays of connectivity between neurons and with muscle to promote the signal transmission required for normal information processing and motor control. Increasing evidence demonstrates that aberrant synapse development is an early sign of several neurodevelopmental (autism and epilepsy) and neurodegenerative (Alzheimer's and Parkinson's) disorders. Our lab uses the larval neuromuscular junction (NMJ) of Drosophila as a genetically tractable in vivo model system to study the elegant interplay of molecules that guide budding neuronal projections to establish precise synaptic connections in the developing nervous system. Wallenda is a conserved MAP kinase kinase kinase (MAPKKK) progrowth factor that drives synaptic growth. Preliminary data from a screen searching for novel regulators of Wallenda signaling suggest that the synaptic cell adhesion molecule Dscam1 might interact with this pathway to modulate synaptic growth. While Dscam1 has an essential role in processes such as axon guidance and self-recognition, little is known about how this molecule is regulated. Recent studies have shown that the tubulin-specific cofactor Tbce may act downstream of Dscam1 to stimulate cytoskeletal remodeling required for the functional formation of neural circuits. These findings have illuminated a potential mechanistic link controlling the coordination of Dscam1 and TBCE through the Wallenda cascade. Although

the data generated from this study support the hypothesis that Dscam1 may function in this capacity, our experiments demonstrate that TBCE is likely not required for Wallenda-driven growth. However, since there are at least five known chaperones (TBCA-E) which form a complex to promote the dynamic assembly of microtubules during neurogenesis, and there is evidence to suggest that other TBCs might be more directly linked to the signaling pathway, our future directions include further investigation of the proposed hypothesis.

ENDURE TRAINEE ABSTRACT

CHELSEA MACKEY

Home Institution and State: **University of Missouri, Missouri**
Email: **cm.santia94@gmail.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Biology and Psychology, May 2018**
Mentors/Advisors at Home Institution: **Dr. Mahesh Thakkar**

ENDURE Trainee Scientific Interest:

I have been fortunate to engage in various research experiences that have shaped my interests in the scientific field. While I still have to give it some consideration, I do believe that I want to address neurological disorders, specifically Alzheimer's Disease, in the future. My research interests also expand to sleep and sleep disorders as well as neurophysiology and neuropsychology.

ENDURE Trainee Career Goals and Plan:

My growing curiosity has led me to the University of Missouri, where I am currently pursuing a degree in Biology and Psychology. I plan to utilize my academic training in these two fields to increase my marketability in the fields of cognitive and behavioral studies as well as continuing my long-term goal with Biology and Psychology as an anchor for a PhD in Neuroscience. With my advanced level of education and training in brain development, I hope to address two main topics in my career: neurological disorders and cognitive and behavioral neuroscience.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Washington University in St. Louis**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Geraldine Kress, PI: Dr. Erik Musiek**

ENDURE Research Project Title: **The Influence of Beta-Amyloid Plaque Deposition on Circadian Systems**

It is known that there are significant behavioral disturbances in the sleep-wake cycle of patients with Alzheimer's disease (AD), a chronic neurodegenerative disease associated with a severe behavioral and cognitive decline. The circadian clock is an intrinsic timekeeping mechanism that regulates many physiological and behavioral processes over a roughly 24-hour cycle, including the sleep-wake cycle. We are investigating the influence of AD pathology on circadian system function by examining the protein levels of Bmal1, a core circadian clock gene, in an AD transgenic mouse model. This mouse model expresses an amyloid precursor protein leading to the acceleration of beta-amyloid (Aβ) plaque deposition. We are using immunohistochemistry to examine the density of Aβ plaques, as well as the amount of expression of Bmal1 at different times of day, in the brains of these mice. We expect that the magnitude of Aβ plaque burden in the hippocampus will correlate with the degree of circadian clock dysfunction at the molecular level. These findings will provide evidence that AD pathology is associated with circadian clock dysfunction and prompt future investigation of the molecular mechanisms whereby circadian clocks are disturbed.

ENDURE TRAINEE ABSTRACT

DERRICK OGOLA

Home Institution and State: **Washington University in St. Louis, Missouri**
Email: **d.k.ogola@wustl.edu**
Undergraduate Academic Level: **Sophomore**
Undergraduate Major and Expected Graduation Date: **Philosophy-Neuroscience-Psychology, 2019**
Mentors/Advisors at Home Institution: **Dr. John Cirrito, Dr. Beau Ances**

ENDURE Trainee Scientific Interest:

At the present time, I am particularly interested in the molecular underpinnings of neurodegenerative disease.

ENDURE Trainee Career Goals and Plan:

Through my research experiences and clinical exposure, I have become enchanted with the possibilities present at the junction of basic science research and patient care. For this reason, I plan to pursue MD PhD training because it provides a unique perspective that enables me to ground my scientific questions in relevant clinical problems, essentially serving as the bridge between science and medicine. Identifying and understanding the fundamental processes involved in disease provides the greatest opportunity of therapeutic intervention.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Washington University in St. Louis**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. John Cirrito**

ENDURE Research Project Title: **Synaptic Dependent Amyloid-? Generation in Vivo in Alzheimer's Disease Mouse Model**

Alzheimer's disease (AD) is the most common cause of dementia and is pathologically characterized by toxic amyloid-β (Aβ) oligomers, plaques, and tau neurofibrillary tangles. Extracellular accumulation of Aβ peptide in the brain appears to precipitate disease onset and the cognitive AD-associated pathogenic cascade. In humans and transgenic models of AD, brain regions with the highest levels of synaptic activity show the greatest amount of Aβ plaques, suggesting Aβ production is closely linked to synaptic transmission. Previous studies by our lab illustrate that direct modulation of synaptic activity dynamically regulates brain Aβ levels in awake animals, with increased synaptic activity rapidly increasing brain interstitial fluid (ISF) Aβ levels and reciprocally for suppressed activity. To determine the relationship between Aβ generation and synaptic activity, our lab has developed novel microimmunoelectrode (MIE) technology that detects Aβ in the brain ISF with high temporal resolution in the hippocampus of living mice (measures Aβ in vivo every 60 seconds over several hours), allowing us to examine Aβ kinetics on the order close to which peptide generation occurs (seconds to minutes). I have custom designed a 3D-printed adaptor to connect the MIE to an injection port which enables us to measure Aβ and locally deliver drugs directly to the dentate gyrus. With these technologies, we pharmacologically manipulated synaptic activity by delivering picrotoxin, a GABA-A receptor antagonist, and diazepam, a GABA-A receptor modulator, increasing and decreasing excitatory transmission, respectively. Large increases in synaptic activity rapidly brought forth higher Aβ levels in the mouse brain, while inhibition of nonspontaneous synaptic activity rapidly decreases Aβ levels in vivo. These findings highlight a close temporal relationship between synaptic activity and Aβ generation in the brain.

ENDURE TRAINEE ABSTRACT

SYDNEY O'NEAL

Home Institution and State: **Tulane University, Louisiana**
Email: **soneal1@tulane.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **BS in Neuroscience, May 2017**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I am interested in all things neuroscience, most recently Schwann cell development, regeneration, and degeneration and which genes regulate these functions. This is something I was able to research this past summer. I am currently working in another neuroscience lab that analyzes the structural and functional factors of different parts of the brain and how these factors relate to certain psychological disorders and deficits.

ENDURE Trainee Career Goals and Plan:

After my senior year, I hope to conduct more research in a lab setting during a gap year in order to gain more research experience. I then hope to start applying to MD/PhD programs that center around either neuroscience or the biomedical sciences. Following this program, my hope is to find a balance between clinical, patient-oriented work and lab-based research.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Washington University in St. Lou**is

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Diana Jose-Edwards, Dr. Eric Herzog, Dr. Kelly Monk, Rebecca Cunningham**

ENDURE Research Project Title: **dock1, an atypical guanine nucleotide exchange factor, regulates Schwann cell development**

Myelin is the insulating, multi-membrane structure that surrounds axons in the central and peripheral nervous system. It facilitates rapid conduction of action potentials from axon to axon. The degeneration of myelin can lead to neurodegenerative disorders. Glial cells produce myelin and the myelinating cells of the PNS are Schwann cells. During Schwann cell development, Schwann cell precursors proliferate and migrate and eventually encompass axons at a 1:1 ratio in a process called radial sorting. Many genes regulate Schwann cell development, however when and how all of these genes function is still unknown. dock1, a gene that codes for an atypical guanine exchange factor, regulates many processes, including migration, phagocytosis, and cell shape in other biological systems. In these experiments, using zebrafish, we aim to determine how and when dock1 regulates Schwann cell development. Studying Schwann cell development in zebrafish is beneficial due to their simplistic yet vertebrate form; their optic transparency; and their genetic tractability. We utilize in situ hybridization to examine the genes expressed by developing Schwann cells, such as sox10, which marks all stages of Schwann cell development. We also aim to understand if Dock1 interacts with ErbB2/3, an essential receptor tyrosine kinase required for Schwann cell development.

ENDURE TRAINEE ABSTRACT

JULIA PAI

Home Institution and State: **New York University**
Email: **julia.pai@nyu.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Neural Science 2017**
Mentors/Advisors at Home Institution: **Dr. J. Anthony Movshon, Dr. David Amodio**

ENDURE Trainee Scientific Interest:

I'm interested in the neural mechanisms underlying cognition and voluntary behavior. I'm particularly interested by how information is processed through various pathways in the brain, and how our present sensory inputs interact with past experience to guide our decisions and perceptions of the world.

ENDURE Trainee Career Goals and Plan:

I intend on pursuing a doctorate in neuroscience and a career in academic research.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Washington University in St. Louis**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Ilya Monosov**

ENDURE Research Project Title: **Local Field Potentials During Reward Processing in Basal Forebrain**

The primate basal forebrain (BF) provides wide-reaching neuro-modulatory inputs to the cortex, hippocampus, and the amygdala, and is thought to be crucial for attention, motivation, emotion, and learning. However, how neural activity in the BF contributes to those functions is poorly understood. Work by Ledbetter, Chen, and Monosov (2016) has demonstrated that BF contains anatomically and functionally distinct subsets of neurons. The medial BF, which has been implicated in learning, memory, and outcome monitoring, contains neurons whose firing rates are enhanced by reward uncertainty. The dorsolateral BF, which provides key outputs to limbic areas that control reward motivated behavior, contains neurons that are suppressed by reward uncertainty. Local field potentials (LFPs) provide additional information about the function and temporal underpinnings of local processing that any individual neuron may not fully represent. Preliminary analyses of BF LFP's suggest that the medial and dorsolateral subregions have different time-frequency response patterns during a value-based decision making task, supporting the idea that the medial and dorsolateral BF comprise two functionally distinct circuits. Characterization of LFP tuning may reveal novel information about what kind of signal is encoded in these BF subregions and their role in reward processing circuits.

ENDURE TRAINEE ABSTRACT

JORDAN PEYER

Home Institution and State: **Vassar College**
Email: **jopeyer@vassar.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Neuroscience, May 2018**
Mentors/Advisors at Home Institution: **Dr. Kelli Duncan**

ENDURE Trainee Scientific Interest:

I am interested in exploring neurotransmitters and hormones, and neuronal stem cell therapy. I aim to analyze the relationships between neurotransmitters and hormones, and hallucinations and false memories induced by schizophrenia or hallucinogens. Additionally, I wish to explore the clinical applications of neuronal stem cell therapies in neurodegenerative diseases.

ENDURE Trainee Career Goals and Plan:

Once I graduate from Vassar, I plan on spending my gap year doing research abroad and applying for MSTP programs. I wish to pursue an MD/PhD, and likely focus my research on behavioral or developmental neuroscience related to my aforementioned scientific interests. Once I graduate from the MSTP program, I will continue on to do my residency and/or my post doc. At this point, I hope to do some political work, pursue a career as a professor, or be a medical-scientist working in the lab and in the hospital.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Washington University in St. Louis**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Andrew Yoo**

ENDURE Research Project Title: **Investigating the roles of NOVA proteins during neurogenesis**

In the Yoo lab, I worked with adult human fibroblasts, directly converting them into neurons through the expression of neuron-specific microRNAs miR-9/9* and miR-124 (miR-9/9*-124). This direct conversion models neurogenesis, and allows for the exploration of the mechanisms of neuronal fate acquisition. My project was to look at this microRNA-based neuronal conversion. I specifically looked at NOVA proteins, neuron-specific RNA binding proteins, which are important for neural development. The role of the two paralogs of NOVA proteins, NOVA1 and NOVA2, during development include regulating multiple splicing networks and translating neuronal transcripts. The knockdown of the NOVA proteins during development has been shown to prevent normative neuronal development, and a similar result was predicted during neuronal fate acquisition. My project thus involved an shRNA-mediated knockdown of the NOVA proteins to explore the significance of the NOVA proteins in neuronal fate acquisition. The results indicate that the knockdown of the NOVA proteins was successful using the shRNA-based approach, and preliminary results suggest that the knockdown hindered normal neuronal development.

ENDURE TRAINEE ABSTRACT

ASHLEY TAYLOR

Home Institution and State: **University of Missouri-St. Louis Missouri**
Email: **amtwv8@mail.umsl.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **BS Biology May 2018**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I am interested in research focused on neurodegenerative diseases, axon regeneration, neuroprosthetics, and spinal cord injuries. The medical and clinical applications of translational research and nanotechnology also intrigue me. I am also interested in research to improve access to treatments and healthcare for those who are disadvantaged.

ENDURE Trainee Career Goals and Plan:

I want to be a practicing physician and conduct neurological research. I want people to have access to the treatments they need while also researching ways to improve and contribute to the scientific and medical fields. I plan on applying to MD/PHD programs.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Washington University in St. Louis**

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title: **Understanding the role of TET enzymes in axon regeneration**

With approximately 12,000 new cases of spinal cord injuries each year in the United States alone (NSCISC, 2012), many experience a traumatic inability to function throughout their daily lives. Currently, rehabilitation therapies are limited and there are no pathways to full recovery. The adult central nervous system of most animals is not able to regenerate injured axons, however, peripheral nervous system neurons are able to initiate a pro-regenerative transcriptional program to regenerate axons postinjury. In order to create treatment options for patients with spinal cord injuries, we want to understand the transcriptional and epigenetic changes that promote regeneration in peripheral neurons. To investigate what regulates these transcriptional changes, we sought to determine the roles of hydroxymethylation and TET enzymes in injured dorsal root ganglia (DRG) using ELISA-based assays. We hypothesize that injury induces increased 5-hmC levels and TET enzyme activity leading to an increase in the expression of genes that promote regeneration. Further, we hypothesize that increasing 5-hmc levels or TET enzyme activity will increase regenerative growth.

ENDURE TRAINEE ABSTRACT

TAYLOR WYNNE

Home Institution and State: **George Mason University, Virginia**
Email: **Tmwynne@ymail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Neuroscience, Summer 2017**
Mentors/Advisors at Home Institution: **Kevin Story, Patrice Granfield**

ENDURE Trainee Scientific Interest:

My scientific interests are neurodegenerative diseases, more specifically, ALS and MS as well as neuro developmental diseases.

ENDURE Trainee Career Goals and Plan:

I wish to be accepted into the MSTP program and start my own lab.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Washington University in St. Louis**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Erik Herzog, Dr. Martha Bagnall**

ENDURE Research Project Title: **Lateral Vestibulospinal Neuron Function**

Vestibulospinal neurons are crucial to the integration of sensory information that helps maintain a normal sense of balance and posture. They receive information from the vestibulocochlear nerve about changes in the head orientation in space and then project to motor neurons. For example, organs responsible for sensing gravity and linear movement called otoliths send information to the brainstem to be integrated. Then signals are sent to the cerebellum, which regulates movement, balance and posture. From there, the signals are sent to vestibulospinal neurons via the vestibulocochlear nerve and the vestibulospinal neurons connect to motor neurons to elicit a motor output response. Vestibular dysfunction as a cause of imbalance offers a particularly intricate challenge in mammals due to intermingling of spinal and neuron populations, thus the vestibulospinal tract remains largely unstudied. However, zebrafish are a good model for the study of vestibulospinal neurons due to their transparency and accessibility of the spinal cord and brainstem. They possess a distinct group of approximately twelve vestibulospinal neurons bilaterally behind each ear. Under normal conditions fish always maintain a dorsal-up orientation with respect to gravity, but anesthetized or dead animals are found on their sides or belly-up. We have already found that in the absence of vestibulospinal neurons, fish swim belly- up, sideways, or even head up or head down. However, the individual role each neuron plays in this behavior is unknown. If individual vestibulospinal neurons are ablated via confocal microscope, we can assess the behavioral output of such lesion more specifically. So far, we have discovered that the lateral, isolated vestibulospinal neuron always increases its activity when the fish is accelerating towards the dorsal direction. We hypothesize that this cell plays a vital role in the swim behavior of zebrafish by using sensory information to help keep fish in normal orientation. This will support the long-term goal of determining how vestibulospinal neurons are translated into appropriate posture and balance in hopes to treat patients with damage to these areas.

BP-ENDURE AT HUNTER COLLEGE

HUNTER COLLEGE
Principal Investigator: *Dr. Regina Miranda*
Principal Investigator: *Dr. Vanya Quinones-Jenab*
Partner Institution: New York University

PROGRAM DESCRIPTION:
Hunter College of the City University of New York (CUNY) recognizes that increasing the number of highly qualified neuroscientists from these underrepresented populations is integral to our future as an academic and research institution. Hunter College aims to increase the number of well-trained, diverse neuroscientists. The overall goal of this application is to develop a neuroscience training program at Hunter that will encourage and prepare students from diverse backgrounds to enter into and succeed in PhD programs in the neurosciences.

Hunter has developed a research-educational partnership with four outstanding T32-awarded universities-New York University, Brown University, University of Michigan, and Vanderbilt University. This partnership will expose 12 BP-ENDURE-trainee students per year to a research-intensive curriculum and an environment of excellence and active research. Moreover, because of the diversity of the proposed mentors, students will be exposed to a broad spectrum of researchers, including basic neuroscientists interested in central nervous system (CNS) issues and applied neuroscientists from the areas of clinical, social, health, developmental, and cognitive neuropsychology.

To achieve our goals, the following aims are proposed: (1) To develop an outstanding group of undergraduate students with diverse backgrounds dedicated to neuroscience research; (2) To provide scientific skill and research experiences to our trainees through research placement with actively funded neuroscientists; (3) To develop academic development and curriculum enhancement activities rooted in the student's research activities; (4) To maintain an effective Administrative Core to support our students' needs and development.

Our measurable objectives during the requested funding period include: (1) 85 to 90% acceptance of trainees to graduate school programs in neuroscience; (2) improvement of our students in quantitative skills and academic achievements, as well as their (3) scientific writing and oral presentations. Outcome from evaluations of the Steering Committee, the external evaluator, and the Administrative Core will guide future modifications to our training initiatives.

ADDITIONAL PROGRAM TEAM MEMBERS:

Dr. Chiye Aoki – Program Director, New York University
Dr. Marianne Weierich – Program Co-Director, Hunter College
Ms. Kizzy Vazquez - Program Administrator, Hunter College
Dr. Heather McKellar – Program Manager, New York University

ENDURE TRAINEE ABSTRACT

JANNAT ARA

Home Institution and State: **CUNY Hunter College**
Email: **jannat.ara73@myhunter.cuny.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Biochemistry 05/2018**
Mentors/Advisors at Home Institution: **Dr. Maria Figueiredo Pereira, Chuhyon Corwin, Dr. Regina Miranda, Dr. Vanya Quinones, Kizzy Vazquez**

ENDURE Trainee Scientific Interest:

My past and current research primarily consisted of studying neurodegenerative disorders such as SCA1, SCA7 and Parkinson's. I thoroughly enjoy this area of research and would like to continue in this field. I would like to create different models of these disorders and in doing so, find therapeutic drugs that can remedy the symptoms.

ENDURE Trainee Career Goals and Plan:

I want to gain more hands-on laboratory research under the mentorship of scientists very knowledgeable in their respective fields. Eventually, a strong neuroscience research background will give me the skills for tackling complex problems, for communicating with scientists who work in diverse areas and aid in my decision making processes. I wish to cultivate a sixth sense that will aid me in better understanding symptoms, treatment choices and so on as a MD/PhD student. I aim to ask, think and solve problems like a scientist.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Michigan**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Vikram Shakkottai, Ravi Chopra, David Bushart, Valerie Smith**

ENDURE Research Project Title: **Purkinje Cell Cav3.1 Expression in SCA1 and SCA7 mice**

Among human ataxic disorders, there are a large number of autosomal dominant cerebellar ataxias such as spinocerebellar ataxia type 1 (SCA1) and spinocerebellar ataxia type 7 (SCA7). Recent studies performed in the Shakkottai lab have shown that Purkinje neurons from the ATXN1-82Q (B053) mouse model of SCA1 and the PrP-floxed-SCA7-92Q BAC4 mouse model of SCA7 show irregular Purkinje cell firing. Since disrupting ion channel functions can affect the pacemaking ability of Purkinje cells, we looked at the voltage-gated calcium channel Cav3.1, also known as the T-type calcium channel. mRNA and protein expressions of cacna1g in SCA1 and SCA7 mice were examined through the use of qRT-PCR and immunohistochemistry techniques. Our data showed highly reduced expression of cacna1g in the cerebellum from both SCA1 and SCA7 mice, suggesting that cacna1g may play a role in the irregular firing of Purkinje cells. Protein expression for Cav3.1 was low in the cerebellum except for lobule 10 where it is conserved for SCA1 mutants. Also, protein expression is similar in SCA7 and wild-type mice in the anterior cerebellum but is less in the posterior of SCA7 mice, specifically in lobule 10. Future research should explain this anterior vs. posterior phenomena and should view T-type ion channels as a possible target for improving symptoms in patients with cerebellar ataxia.

This project was supported in part by the NIH-NINDS BP-Endure Grant R25NS080686.

ENDURE TRAINEE ABSTRACT

BRIGETT CARVAJAL

Home Institution and State: **Hunter College**
Email**: bricarvajal@gmail.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Psychology, 12/2017**
Mentors/Advisors at Home Institution: **Dr. Peter Serrano**

ENDURE Trainee Scientific Interest:

My current project is focused on investigating the role of sex hormones on cognition and changing spine dynamics. Specifically, and not limited to how sex differences influence our behavior. I am currently examining changing spine dynamics as a consequence of sex hormones. This project is of interest because of its applicability to synaptic plasticity and development.

ENDURE Trainee Career Goals and Plan:

My desire to pursue a graduate degree in neuroscience has arisen from a lifelong fascination with how the brain works. I plan to apply to an MD/PhD program where I will pursue my Ph.D. in Neuroscience. Pursing a dual MD/PhD degree is the ideal way to approach translation research that will allow me to improve quality care for future generations and better serve the scientific community.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Michigan**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Jill B. Becker**

ENDURE Research Project Title: **Altering preference and motivation within the reward system by blocking estrogen receptors**

In human and rodent models females advance through the stages of addiction, from initial use to dependence, at a faster rate than men do, suggesting there is an underlying biological factor that makes females more vulnerable to addiction. The nucleus accumbens (NAc) and dorsolateral striatum (DLS) are two crucial sites within the reward system that are involved in the transition from drug taking to avid drug seeking. When this transition occurs, an enhanced cocaine-induced dopamine (DA) is released in the DLS. Previous studies highlight the effects of estradiol in the DA system, which is thought to contribute to the increased rewarding effect of cocaine in females.

We implanted ICI ? an estrogen receptor antagonist ? into either the NAc or DLS to attempt to block the development of a preference for cocaine. In a choice self-administration paradigm, rats were given the choice of cocaine at the expense of a food reward. Our results replicated previous findings of sex-biased preference. No significant difference existed between groups treated with ICI in the NAc and DLS. However, directly following the first ICI implant, the number of choice infusions plummeted in week 2, delaying preference formation for females treated with ICI in the DLS. This suggests that introducing ICI in the DLS briefly disrupts preference formation in female rodents. Studies are underway to further examine this effect. This work was supported by NIH grants R25-NS-80686-6 and R01-DA039952-01.

ENDURE TRAINEE ABSTRACT

ANDREA CUMPELIK

Home Institution and State: **New York University, New York**
Email: **acumpelik@nyu.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Neuroscience, 2017**
Mentors/Advisors at Home Institution: **Dr. Gyorgy Buzsaki, Dr. Lucas Sjulson, Dr. Chiye Aoki, Dr. Vanya Quinones, Dr. Regina Miranda, Dr. Margarita Kaplow**

ENDURE Trainee Scientific Interest:

I am interested in studying neural systems underlying complex behaviors such as memory and reward, as well as their pathologies such as those that occur in addiction. Currently, I am working in the Buzsaki lab at New York University, on a project that studies the role of hippocampal inputs to the nucleus accumbens in conditioned place preference. We combine molecular tools such as optogenetics with electrophysiological data, which makes it possible to target specific subsets of neurons while simultaneously observing population activity.

ENDURE Trainee Career Goals and Plan:

My current experience has enabled me to learn various techniques that will come in useful for the future; for example, in vivo recording methods, modulation techniques such as optogenetics, data analysis, and stereotaxic surgery. After graduation, I plan to continue on to graduate school to pursue a career in neuroscience research. I plan on continuing to study the hippocampus and relating electrophysiological information to behavior.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **New York University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Gyorgy Buzsaki, Dr. Lucas Sjulson**

ENDURE Research Project Title: **The role of selective synaptic potentiation in hippocampal inputs to the nucleus accumbens in conditioned place preference**

Addiction can be described as pathological perception of reward. An important step in developing a treatment is understanding the mechanisms underlying relapse. Relapse can be triggered by cues that are associated with the drug, such as the context in which the drug is administered. Conditioned place preference (CPP) is a model of addiction in which a reward is repeatedly associated with a location; its neural substrate has not been well described. The nucleus accumbens encodes reward and associated cues, and place cells in the hippocampus encode spatial location. We hypothesize that a key substrate of CPP is potentiation of selective inputs from hippocampal place cells to the accumbens.

We recorded from both brain regions before, during, and after conditioning. Over time, the accumbens showed increased activity in response to the reward-paired chamber that was not accounted for by a change in hippocampus; that is, the accumbens fired more strongly in response to the same hippocampal input. The neurons that showed this change were more synchronized to hippocampal theta rhythm, suggesting that this synaptic change could be mediated by the hippocampus. These results will help identify pathways involved in reward reinforcement which in turn will help us understand this complex disorder.

ENDURE TRAINEE ABSTRACT

KELVIN DE LEON

Home Institution and State: **Hunter College, New York**
Email: **kelvin.deleon71@hunter.cuny.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology, May/ 2017**
Mentors/Advisors at Home Institution: **Dr. Peter Serrano, Dr. Amber Alliger**

ENDURE Trainee Scientific Interest:

I am interested in understanding how different drugs, such as benzoylmethylecgonine, affect neuroinflammation that is caused by the immunodeficiency virus.

ENDURE Trainee Career Goals and Plan:

I plan to attain a PhD in Neuroscience in order to conduct research as a tenured professor at a top research institution.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Brown University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Tara L. White**

ENDURE Research Project Title: **Emotional, Physiological and Neurocognitive Effects of Adderall in Healthy College Students**

College students tend to misuse Adderall, a Schedule II controlled stimulant prescribed as a treatment for Attention Deficit Hyperactivity Disorder (ADHD). Stimulant drugs enhance cognitive performance of individuals with ADHD, particularly attention, memory, self-regulation and executive functions. To evaluate cognitive effects of Adderall in individuals who are not diagnosed with ADHD, we conducted a double blind, placebo control, within-subjects study. Thirteen healthy college students aged 18 to 24 were given an oral dose of Adderall (30mg), and placebo on two separate days, counterbalanced for order. Laboratory assessments of neurocognitive function were conducted during the peak time period of the drug effect on each day. Physiological and mood assessments were conducted every 30 minutes over the 5.5-hour study period. Drug effects were evaluated using repeated measures Analyses of Variance. The study provides new information on the emotional, physiological and neurocognitive effects of Adderall in healthy college students. Neurocognitive effects may further explain the misuse of stimulants among young adults. This project was supported in part by the NIH-NINDS BP-Endure Grant R25NS080686 and by grants to T.L. White and L. Weyant (co- PIs) from the Rhode Island Neuroscience Collaborative (RINC), Brown University Institute for Brain Science (BIBS), George & Ann Ryan Institute for Neuroscience (URI), and Norman Prince Neurosciences Institute (NPNI).

ENDURE TRAINEE ABSTRACT

ILANA DEYNEKO

Home Institution and State: **Hunter College, New York**
Email: **Ilana.Deyneko63@myhunter.cuny.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology, Concentration in Behavioral Neurobiology, 06/2017**
Mentors/Advisors at Home Institution: **Dr. Carmen Melendez-Vasquez, Dr. Vanya Quinones-Jenab, Dr. Regina Miranda, Dr. Mariann Weierich, Dr. Chiye Aoki, Dr. Kizzy Vazquez, Program Administrator**

ENDURE Trainee Scientific Interest:

I am interested in the underlying molecular, cellular, behavioral, and genetic aspects of decision making. I would like to study how the brain's physical interactions result in the thought processes that lead to decision making and action.

ENDURE Trainee Career Goals and Plan:

I plan to go to Graduate school to study Neuroscience after I finish my Undergraduate degree. Afterwards, I intend to complete a post-doctoral degree.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **New York University**

Mentors/Advisors at ENDURE Summer Research Experience Institution**: Dr. Claude Desplan, Dr. Michael Perry**

ENDURE Research Project Title: **Origins of Patterning in the Insect Eye: Using Molecular Markers to Establish Photoreceptor Homology**

Our project focused on species-specific differences between photoreceptor types within insect ommatidia (unit eyes) and on the evolutionary modifications in the mechanisms that specify retinal cell differentiation. Previous work provided extensive information about development in Drosophila melanogaster flies, and in Vanessa cardui butterflies. We examined the expression of regulatory factors of more ancestral insect species, Acheta domesticus (crickets) and Schistocerca americana (grasshoppers), and evaluated alternative distribution of ommatidia and the similarities between species. We completed antibody stains using established molecular markers of photoreceptor homology: Prospero, Spalt, and Dve. Initial results showed cross-reactivity in all target species. Imaging showed that crickets have eight photoreceptors with only one R7 type cell, implying that the second R7 in butterflies is an evolutionary gain. Next, we looked at the role of the gene Spineless in ommatidial distribution. Previous studies indicate that Spineless expression results in stochastic patterning (random distribution of ommatidial types) in flies and butterflies. We will test grasshopper stochasticity and determine if Spineless plays a role in cricket regionalization (an alternative to stochastic patterning). This work will provide a better understanding of stochastic vs. deterministic patterning, and provide a more detailed evolutionary history of mechanisms that pattern the insect eye.

ENDURE TRAINEE ABSTRACT

AJA EVANS

Home Institution and State: **New York University, New York**
Email: **aqe200@nyu.edu**
Undergraduate Academic Level: **Graduated**
Undergraduate Major and Expected Graduation Date: **Neuroscience, May 2016**
Mentors/Advisors at Home Institution: **Dr. Chiye Aoki**

ENDURE Trainee Scientific Interest:

My interest in neuroscience began with me wanting to understand myself. As my knowledge of the field has increased it has come to influence unexpected aspects of my life from how much sleep I get, to the foods I eat, to how I study. There is value in understanding the brain that can help positively impact how we operate in our everyday lives. My future goals are to find ways to effectively interest and communicate neuroscience to the masses in an effort to positively impact well-being, and advocate for the investment in brain health.

ENDURE Trainee Career Goals and Plan:

In my lab experiences I have had the chance to investigate outside factors that influence neuronal development early in life and continue to have structural and behavioral consequences throughout adulthood. Studying disorders like anorexia nervosa and fetal alcohol syndrome in rats and zebrafish respectively, have pushed me to think about other early life experiences may go on to impact the adult brain. My research interest lies in how we can manipulate experience to change the ultimate impact on the brain.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution:

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. David Badre, Dr. Apoorva Bhandari, Dr. Theresa Desrochers**

ENDURE Research Project Title: Noradrenergic axons in the hippocampus of adolescent mice: **Effects of BDNF val66met polymorphism and exercise + food restriction**

Adolescence is a period of heightened neurogenesis in the dentate gyrus, and a time when the brain is particularly susceptible to environmental stressors. Anorexia Nervosa (AN) is one disorder which often develops during this period. AN has the highest mortality rate among mental disorders, but little is understood about the structural impact it has on the brain. Previously we have shown that AN impacts the noradrenergic (NA) system in the cerebellum by increasing varicosity density along axons. Whether this system is also altered in the hippocampus has yet to be determined. To investigate this question, we utilized mice with a BDNF polymorphism which decreases activity dependent BDNF, a growth factor that has been shown to promote NA neuronal survival. We used an animal model of anorexia called activitybased anorexia (ABA), whereby food restriction evokes voluntary food restriction and excessive exercise.

In total 53 mice who expressed a BDNF polymorphism or the wild-type allele were exposed to ABA or kept as controls. NA axon fiber density was measured in the hippocampal hilus of each animal. No genotype or ABA effect on fiber density was found. Future plans to analyze varicosities along these axons may expose structural changes to the NA system.

ENDURE TRAINEE ABSTRACT

D'NEA GALBRAITH

Home Institution and State: **Hunter College**
Email: **dnea.galbraith@gmail.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Psychology, Neuroscience Concentration**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I am currently entering my fourth semester in the Schafe lab and I am beginning to focus my research interests and develop a question for my honors thesis. I am particularly interested in traumatic memory formation, and how traumatic events/experiences contribute to the development of mental disorders, such as PTSD. I would like to further pursue this question by investigating specific neural and molecular changes within the amygdala and other brain regions that may be altered in a persistent manner as a result of chronic stress exposure.

ENDURE Trainee Career Goals and Plan:

I am ultimately interested in obtaining a Ph.D. in neuropharmacology, along with a Pharm.D, or possibly pursue an M.D./Ph.D. My research interests lie in traumatic memory formation, and how traumatic events/experiences contribute to the development of mental disorders. I would like to further pursue this question by investigating specific neural and molecular changes within the amygdala and brain regions involved in stress and memory that may be altered in a persistent manner as a result of chronic stress exposure. Finally, I want to work on possible pharmaceutical or alternative "nutraceutical" interventions to help prevent the possible negative effects of chronic stress and traumatic memories in these regions.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution:

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title: **The Effects of Curcumin on Molecular Changes in the Lateral Amygdala and Infralimbic Cortex and Fear Extinction of Chronically Stressed Rats**

Exposure to chronic stress leads to the release of glucocorticoid hormones such as cortisol or corticosterone (CORT). This can have contrasting effects on both the morphology and physiology of different memory-related regions of the brain, such as the infralimbic cortex (IL) and lateral amygdala (LA). Previous studies have shown long-lasting dendritic hypertrophy and increased spine density in LA neurons in chronically stressed rats. Our lab has also shown that chronic oral exposure to CORT persistently enhances the expression of synaptically-localized proteins within the LA of rats. Furthermore, we found that CORT-induced synaptic effects in the LA are prevented if rats are fed a curcumin-enriched diet. Chronic restraint stress can also lead to dendritic atrophy and reduce spine density in the IL of rats, but whether these morphological changes persist and whether it alters IL-dependent memories, such as fear extinction, is not well studied. We aim to determine if chronic stress is associated with morphological remodeling in the LA and IL by restraining male Wistar rats for 10 days. We are also investigating whether a curcumin-enriched diet during the restraint stress period can prevent this morphological remodeling and prevent the modulation of aspects of fear memories known to depend on the LA and IL. We expect to find increased spine density in the LA, reduced spine density in the IL, and impaired extinction of fear memories in chronically stressed rats. Finally, we hypothesize that a curcumin-enriched diet can prevent these effects of chronic stress. This project was supported in part by the NIH-NINDS BP-Endure Grant R25NS080686.

ENDURE TRAINEE ABSTRACT

DESIREE GORDIAN

Home Institution and State: **City University of New York, Hunter College - New York**
Email: **desiree.gordian96@myhunter.cuny.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology, 2017**
Mentors/Advisors at Home Institution: **Dr. Nesha Burghardt**

ENDURE Trainee Scientific Interest:

My interest is in understanding the mechanism underlying sensation and reward systems. Currently, I conduct research at Dr. Nesha S. Burghardt's lab at City University of New York, Hunter College where I am writing an honor's thesis focusing on the neural circuits underlying addiction and reward in two strains, C57BL/6 and 129 SvEv, of adolescent mice. We examine behavior by using methamphetamineinduced condition place preference as the paradigm, and we visualize changes in protein expression in brain tissue using immunohistochemistry techniques in order to localize and quantify cellular changes.

ENDURE Trainee Career Goals and Plan:

My ultimate goal is to pursue a PhD in cognitive and behavioral neuroscience. I am interested in researching alterations in auditory processing and perception, and therapeutic interventions.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **City University of New York, Hunter College - New York**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Kent C. Berridge**

ENDURE Research Project Title: **Tactile processing in typically developing adults and links to autism traits**

Alterations in sensory processing across modalities is a criterion used to diagnose autism spectrum disorder (ASD). It has been postulated that deficiencies in tactile processing play a critical role in learning, social development, and interaction in individuals with ASD. However, neural mechanisms underlying alterations to tactile processing are not fully understood. Our goal is to enhance our understanding of tactile information processing and to provide empirical basis for advancing the treatment of sensory-based symptoms in ASD. We examined the relationship between physical tactile stimuli and subjective perception by using a simple yes/no detection task. We sought to examine the relationship between behavior and somatotopy mapping of inter-digit distance in the somatosensory cortex. We used 7T functional magnetic resonance imaging (fMRI) neuroimaging techniques to investigate somatosensory cortical activity in response to vibrotactile stimulation, delivered at high intensity (35Hz, 200?m) to left hand digits 2-4. Preliminary results suggest the ability to replicate single-digit separation in response to vibrotactile stimulation. Result demonstrate that the wider the range of intensities over which the participants' responses changes, the less likely they are to lack interest in engaging in social interactions. Identifying behavioral and neural correlates of touch may provide further insight into contributing mechanisms underlying ASD. This project was supported in part by the Vanderbilt/ NIMH Silvio O. Conte Center for Neuroscience Research Pilot Award, NIH F31MH106291, and NIH-BPENDURE 2R25NS080686-06.

ENDURE TRAINEE ABSTRACT

HALA HADDAD

Home Institution and State: **Hunter College, New York**
Email: **halahaddad4@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology and Spring 2017**
Mentors/Advisors at Home Institution: **Dr. James Salzer**

ENDURE Trainee Scientific Interest:

I am fascinated by the unknown aspects of the brain and the questions that could be drawn from investigating the elemental neural processes of the deficit and the physiological brain. I am interested in the complex processes and circuitry governing motor and sensory function and how a simple lesion induces such a vast and varied array of disorders. My research experiences have driven my interest in the fundamental neural and cellular basis of sensorimotor functions.

ENDURE Trainee Career Goals and Plan:

My career goal is to investigate the underlying cellular and molecular processes of motor and sensory behavior. I plan to earn my Ph.D. in cellular and molecular neuroscience relating to neurodegenerative diseases, which is vital to amplify my problem-solving skills and equip me with the necessary advanced tools that will refine my empirical and technical skills. Ultimately, I aim to continue my research after earning my Ph.D. and advocate for increased community outreach and education by the scientific community.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Brown University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Aaron Held, Dr. Diane Lipscombe, Dr. Kristi Wharton**

ENDURE Research Project Title: **Morphology and function of synaptic transmission in Drosophila models of ALS**

Amyotrophic lateral sclerosis (ALS) is a neurodegenerative disease that causes upper and lower motor neuron deterioration and death. Familial ALS (fALS) has been associated with mutations in as many as 20 different genes. Mutation in the TARDBP gene results in defective forms of the transactive response DNA-binding Protein-43 (TDP-43) and expanded hexanucleotide repeats in the C9orf72 gene have been associated with motor neuron degeneration. One aim of our study is to explore the morphological and functional effects of mutated TDP-43 expression in Drosophila. In a second aim, we will also study the effects of GGGGCC (G4C2) hexanucleotide repeat expansions in Drosophila. To this end, we will use immunohistochemistry and electrophysiology approaches to assess the effects of ALS-causing gene mutations and hexanucleotide repeat expansions at neuromuscular junctions of Drosophila larvae. These approaches may provide important information about some of the early functional changes that occur at the nerve muscle junction in Drosophila ALS models that ultimately result in failure of transmission at this critical synapse. This project was supported in part by the NIH-NINDS BP-Endure Grant R25NS080686

ENDURE TRAINEE ABSTRACT

ALEJANDRA PATINO

Home Institution and State: **New York University, New York**
Email**: avp282@nyu.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Neural Science and Psychology, 2017**
Mentors/Advisors at Home Institution: **Dr. Kally O'Reilly, Dr. Andre Fenton**

ENDURE Trainee Scientific Interest:

I have recently become interested in ASD research and hope to gain experience in the molecular and genetic approaches to this kind of research.

ENDURE Trainee Career Goals and Plan:

As of recently I have become interested in pursuing an MD-PhD instead of purely a PhD. Thus, after I graduate this year I hope to complete a Postbac research program where I can continue to do research while taking a few classes needed to fulfill pre-health requirements.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Brown University**

Mentors/Advisors at ENDURE Summer Research Experience Institution**: Dr. Rebecca Burwell**

ENDURE Research Project Title: **Optogenetic Modulation of Recognition Memory via the Prefrontal Cortex**

The perirhinal cortex (PER) and the prefrontal cortex (PFC), known parts of the network that is responsible for recognition and association memory, have been implicated in the signaling of novelty and familiarity. Previously our lab found that optogenetically stimulating the rat PER at 30 Hz stimulation caused rats to increase exploration of familiar objects, while stimulation at 11 Hz caused rats to decrease exploration of novel objects. Thus, the 30 Hz frequency caused rats to treat a familiar object as novel, and the 11 Hz frequency caused rats to treat a novel object as familiar. Because of the known connections between PER and the ventromedial PFC as well as the agranular insular area of the lateral PFC, we hypothesized that these regions may modulate exploratory behavior via the same frequency bands. As a first step in testing this hypothesis we optogenetically stimulated these areas of the PFC at 30 Hz during object exploration. We predicted and found that, in fact, stimulating both areas of the PFC led to increased exploration of familiar objects as previously found in the PER. These results provide evidence that a circuit including PER, medial PFC, and medial agranular cortex is responsible for novelty guided memory. This project was supported in part by the NIH-NINDS BP-Endure Grant R25NS080686.

ENDURE TRAINEE ABSTRACT

LUIS RAMIREZ

Home Institution and State: **NYU Tandon School of Engineering, New York**
Email: **luisdramirez@nyu.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Science and Technology Studies, May 2017**
Mentors/Advisors at Home Institution**: Dr. Marisa Carrasco, Dr. Rachel Denison**

ENDURE Trainee Scientific Interest:

I am profoundly fascinated with our moment-to-moment experience and investigating how our different modalities, as complex as they are, integrate into one seamless, cohesive experience we call perception. This entails studying the duality between stimuli and the sensations and perceptions evoked by these stimuli, which are themselves highly dependent on the dynamic complexities of neuronal networks. Therefore, I am interested in deconstructing the mechanisms underlying working memory, perception, particularly visual perception, through brain imaging techniques, computational modeling, and psychophysics.

ENDURE Trainee Career Goals and Plan:

Ultimately, I want to place myself in a position where I am consistently learning, seeking out new information through research, and teaching others about the intricacies and beauty of human perception. I plan on pursing a PhD in neuroscience on the systems level, as I see graduate study and academia as the best way of satisfying an insatiable hunger to learn, teaching others, and contributing to science, the development of technology, and society. Completing these goals has the potential to benefit related fields of study that utilize our knowledge of perception, such as artificial intelligence, neuro-prosthetics, and sensory disorders.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Vanderbilt University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Frank Tong, Young Eun Park**

ENDURE Research Project Title: **Development and Evaluation of a New Test of Face Perception and Face Memory Ability**

The ability to recognize faces is vital for seamlessly navigating daily social interactions. Well established face recognition measures such as the Cambridge Face Memory Test (CFMT) and Cambridge Face Perception Test (CFPT) reveal the scope of reliability and validity that can be achieved in efforts to quantify individual differences in face recognition ability. Doing so provides methods to not only diagnose prosopagnosia, but to also uncover the extent of face recognition ability. In this pilot study (N=7), we investigated whether more fine-grained and sensitive measures of face processing might be achieved by using computer-generated face stimuli that vary continuously along the dimensions of age and gender, and by allowing participants to report perception and memory of a face using a continuous measure. We incorporated each of these components in an effort to develop a new face recognition test, the Tong Lab Face Test, which shows promise to serve as a reliable and valid measure of face recognition ability for a full-scale study. This project was supported in part by the NIH-NINDS BP-Endure Grant R25NS080686.

ENDURE TRAINEE ABSTRACT

MUYU SITU

Home Institution and State: **CUNY Hunter College, New York**
Email: **Muyu.Situ24@myhunter.cuny.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology, January 2018**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

My current research interests revolve around understanding the mechanisms between brain and behavior, specifically in mental disorders. In order to study these mechanisms, I plan to apply to a program that works with the behavioral and physiological aspects of stress. I am interested in researching the influence of internal factors such as chemical disparity in the brain, on behavior in all human and non-human subjects. Furthermore, I am interested in the role of genetic inheritance in mental illnesses at a molecular level to understand how these disorders develop. The objective of my future research is to improve the system behind behavioral therapy and reduce the necessity of drugs, such as anti-depressants.

ENDURE Trainee Career Goals and Plan:

As a senior majoring in psychology with a behavioral neuroscience concentration, I plan to continue to obtain my Ph.D. in Behavioral Neuroscience. Afterwards, I will continue to work in research to better understand the relationship between the brain and behavior, as well as working in academia teaching concepts of neuroscience to future students. Through the BP Endure program, I anticipate to learn more about the innovations in the field of behavioral neuroscience. Being able to network with the participating institutions and the experts in the program will allow me to broaden my understanding of the various matters in this field.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Michigan**

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title: **Adolescent cocaine induces addiction-associated epigenetic modifications in the prefrontal cortex of selectively bred rats that are typically resilient to cocaine addiction**

Adolescence is a critical stage of development when drug abuse is often initiated. Genetic predisposition and environmental experiences during adolescence are important factors that likely determine long-term vulnerability for drug addiction. Together, these factors may mediate certain epigenetic mechanisms that modify gene transcription without altering the genome. Repeated cocaine experience has been shown to induce epigenetic alterations on histone 3 lysine 9 sites (H3K9), specifically tri-methylation (me3) and acetylation (ac), in areas such as the prefrontal cortex (PFC). However, the impact of adolescent cocaine in individuals that differ in inborn addiction liability is not known. We hypothesize that adolescent cocaine will increase expression of these epigenetic marks within PFC. Selectively bred high-responder rats (bHR) show more addiction-like phenotypes (e.g., cocaine sensitization) compared to bred low-responders (bLR). Both bHRs and bLRs were administered either cocaine or saline for 7 days. All rats were sacrificed in adulthood, and epigenetic targets were visualized using immunohistochemistry and quantified using unbiased stereology. We found that only bHRs showed psychomotor sensitization after 7 days of adolescent cocaine, but only bLRs showed increased expression of H3K9me3 and acH3K9 within PFC. These data suggest that genetic predisposition influences how an individual is impacted by adolescent cocaine use.

This project was supported in part by the NIH-NINDS BP-Endure Grant R25 NS 80686-6, NIDA Grant 5P01DA021633 (HA), National Institutes of Health (NIH) Grant R01MH104261, Office of Naval Research Grant N00014-09-10598, Office of Naval Research Grant N00014-12-1-0366 (HA), Plan Nacional sobre Drogas Grant 2012/011 (MSSI, Spain) (MJGF), and NIDA Grant T32 DA007268 (AP).

ENDURE TRAINEE ABSTRACT

CATHERINE UBRI

Home Institution and State: **Hunter College, New York**
Email: **cubri7@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology, 2018**
Mentors/Advisors at Home Institution: **Dr. Nesha Burghardt**

ENDURE Trainee Scientific Interest:

My goal is to study how neurological processes are modified by our social interactions and cultural upbringings, particularly in people from disadvantaged backgrounds. Furthermore, I want to study how these relationships impact our affective health, decision-making and relationship skills. I hope that with this research, I can help shed a light on the positive and negative impacts certain circumstances can have on affective health, decision-making capabilities.

ENDURE Trainee Career Goals and Plan:

I want my work to further an understanding of how socioeconomic status and resulting relationships impact neurological processes. I would then like to work on restorative modes of research dependent on the findings.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution:

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title: **The Effects of Curcumin on Adult Hippocampal Neurogenesis and Neurogenesis-Dependent Learning**

Curcumin, the primary active ingredient in the turmeric root, is a natural compound with anti-inflammatory properties and potential antidepressant effects. While studies indicate that curcumin stimulates cell proliferation in the hippocampus, it is not clear if these changes in neurogenesis contribute to hippocampal function. Given that adult-born neurons are integrated into hippocampal circuitry approximately 4 weeks after birth, we are characterizing the effects of 4 weeks of dietary curcumin on adult hippocampal neurogenesis and contextual discrimination, a task that is sensitive to changes in neurogenesis. One day after behavioral testing, mice were injected once with BrdU and perfused 2 or 24 hours later to assess the effects of curcumin on cell proliferation. We will also quantify cells expressing doublecortin, a protein transiently expressed in adult-born neurons. The effects of curcumin on cell maturation will be evaluated by analyzing dendritic branching of doublecortin positive cells. All analyses will be done across the entire dorsoventral axis of the dentate gyrus, in the event that curcumin differentially affects neurogenesis in the dorsal versus the ventral region. These experiments will provide insight into how curcumin-mediated changes in neurogenesis might promote cognitive function and/or emotional regulation mediated by the hippocampus. This project was supported in part by the NIH-NINDS BP-Endure Grant R25NS080686.

ENDURE TRAINEE ABSTRACT

LESLIE ZHEN

Home Institution and State: **Hunter College, New York**
Email: **Leslie.zhen@macaulay.cuny.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology with Behavioral Neuroscience Concentration, 06/2017**
Mentors/Advisors at Home Institution: **Dr. Peter Moller**

ENDURE Trainee Scientific Interest:

My interests range broadly from behavioral psychology to cognitive neurobiology. Specifically, I am interested in the role of music, a unique arrangement of pitches and rhythms, on cognitive processing. I wish to understand how the auditory environment guides our learning, subsequent behavioral and motor development, as well as the neural correlates of these cognitive and behavioral processes. By exploring how the brain interacts with and learns about our auditory environment and subsequent neural changes, we can better understand our perceptual neural networks, which play a vital role in our daily lives.

ENDURE Trainee Career Goals and Plan:

I am completing my honors thesis research investigating the dose-dependent effects of methamphetamine on various behaviors, as well as on spatial learning and cognitive flexibility. Following undergraduate studies, I will pursue a Ph.D. to conduct research in auditory cognitive neuroscience. In the future, I hope to transfer the skills and analytical thinking acquired from my research to areas such as education or research, to help progress our understanding of music's effects on the brain and improve our learning, development, and cognition.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **New York University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Lorenzo Diaz-Mataix, Dr. Joseph LeDoux**

ENDURE Research Project Title: **Classifying rats based on differences in conditioned responses to threat.**

In auditory Pavlovian threat conditioning (PTC), an initially neutral conditioned stimulus (CS) is presented with an aversive unconditioned stimulus (US). Henceforth, the animal learns that the CS predicts the US and subsequent CS-alone presentations induce conditioned responses (CR) such as freezing. Use of population averages in conditioning studies have furthered our understanding of neural systems implicated in PTC, but ignores systemic variability of organisms. Our research assessed individual differences in freezing during conditioning and long-term memory testing (LTM). All rats (n=60) were conditioned with five tone-shock pairings, then tested for memory. Freezing was scored offline and unsupervised-cluster analyses were used to assign animals into different groups depending on freezing. We found that although all groups express equivalent initial freezing intensity during LTM, the extinction rate and final freezing level was significantly lower in low-freezers. By contrast, highfreezers do not extinguish the CR as fast as average-freezers. Surprisingly, averaging all animals' freezing masks the behavior of the extreme-freezing phenotypes, which constitutes approximately 40% of the population. Future studies investigating neural correlates of these extreme responses to PTC, which parallel the diverse responses to traumatic incidents, may yield insights on the mechanisms of trauma and resilience. Funded by NIH-NINDS BP-Endure Grant R25NS080686.

NEUROSCIENCE RESEARCH OPPORTUNITIES TO INCREASE DIVERSITY (NeuroID)

UNIVERSITY OF PUERTO RICO RIO PIEDRAS

Principal Investigator: *Dr. Jose Garcia-Arrarás*
Principal Investigator: *Dr. Carmen S. Maldonado-Vlaar*
Partner Institutions: Inter-American University of Puerto Rico at Bayamon Campus, Metropolitan University, Sacred Heart University of Puerto Rico

PROGRAM DESCRIPTION:

Neuroscience Research Opportunities to Increase Diversity (NeuroID) from the University of Puerto Rico Rio Piedras Campus aims to increase the opportunities available for undergraduate students in the area of Neurosciences. The proposal makes use of the strong Neuroscience expertise among UPR investigators and fortifies the underlying neuroscience network that joins undergraduate students, island investigators and their collaborators in mainland institutions.

The training program consists of three major components: (1) Research Experience - An intense research experience during the academic year and a summer experience in a laboratory at an institution in the mainland USA, such as Harvard, Yale, Univ. Colorado Denver, Univ. of Vermont, Northwestern University, Univ. Miami, that have active T32 training grants in neuroscience and/or excellent track record in recruiting and training underrepresented minorities. (2) Academic training participation in seminars, workshops and selected courses to enhanced their knowledge in neurobiology, and understanding of a research career. (3) Student development activities - Participants will enter a mentoring program that includes community outreach activities, scientific writing and oral presentations and other professional enhancement activities.

The proposed activities together with an established mentoring program with members of the Neuroscience community will serve to increase the student competitiveness and enhance their interest in continuing a research career in neuroscience. The NeuroID program will extend the impact of other successful programs at the University of Puerto Rico, not only by focusing on the Neuroscience field but also by greatly expanding the number of possible mentors, increasing the pool of available applicants as well as providing an inclusive and broader training program.

ADDITIONAL PROGRAM TEAM MEMBERS:

Dr. Karen Gonzalez - Universidad Metropolitana, SUAGM
Dr. Armando Rodríguez - Interamerican University — Bayamón
Mrs. Agda E. Cordero Murrillo – Sacred Heart University of Puerto Rico
Ms. Zobeida Diaz – Program Administrator, University of Puerto Rico – Rio Piedras

ENDURE TRAINEE ABSTRACT

ROBERTO A. APONTE-RIVERA

Home Institution and State: **University of Puerto Rico Rio Piedras, Puerto Rico**
Email: **r_andres7@outlook.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Cell & Molecular Biology, May 2017**
Mentors/Advisors at Home Institution: **Dr. Crisitina Velzquez-Marrero, Dr. Josi E. Garcia-Arrars, Dr. Carmen Maldonado-Vlaar**

ENDURE Trainee Scientific Interest:

I'm interested in exploring the neurobiological basis of behavior because understanding basic behaviors will lead to greater insights on the origin of mental illnesses. I would like to explore topics such as motivated behaviors, sensation and perception, emotion, and decision making using techniques such as electrophysiology, calcium imaging, optogenetics, and sequencing. These techniques will allow me to identify and define the neural circuits involved in these behaviors, providing a comprehensive map of brain function for targeted therapy. I would also like to investigate the role of glial cells within these functional behavioral circuits.

ENDURE Trainee Career Goals and Plan:

I plan on pursuing a Ph.D. in Neuroscience. After that, I would continue in academia by pursuing a PostDoc. I'm aware of how building a track record is important for pursuing research as part of academia; therefore, I'm open to the different possibilities that might present themselves during my Ph.D. I've had the opportunity to learn about these different career paths such as science policy, technology transfer, patent reviewer, scientific writing, and consulting. However, I haven't had any experience in many of these fields except scientific writing; thus biasing my main option on continuing a career as researcher.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Icahn School of Medicine at Mount Sinai**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Eric J. Nestler, Dr. Kristen Brennand, Dr. Jeremiah Faith**

ENDURE Research Project Title: **Exploring the role for nucleus accumbens beta-catenin expression in alcohol consumption**

The nucleus accumbens (NAc) is a brain region that is involved in regulating rewarding and aversive behaviors. Dysregulation of β -catenin expression and function in NAc has been implicated in psychiatric diseases such as depression, anxiety, and drug addiction. Recent evidence suggests that β-catenin within the NAc may be involved in the development of alcohol tolerance via alterations in the Wnt/-catenin signaling pathway. To understand the role of NAc β-catenin on alcohol consumption, we utilized β-catenin floxed mice and viral-mediated gene transfer to conditionally knockout β -catenin expression in the NAc. We hypothesized that knocking out β -catenin from the NAc would decrease ethanol consumption. Mice were given intermittent access to 20% ethanol in a 2-bottle choice paradigm (IAE) have been shown to escalate ethanol drinking in a robust manner. We provided a separate cohort of transgenic mice with a 6-hour 20% ethanol/saline or saline pretreatment via intraperitoneal injections before IAE. We validated the localization of our viral infection to the NAc and confirmed β -catenin knockdown using qPCR. Our results showed that conditional knockout of β catenin expression in the NAc of mice results in a trend towards reduced ethanol preference.

ENDURE TRAINEE ABSTRACT

CHRISTIAN AVILA

Home Institution and State: **University of the Sacred Heart**
Email: **cavilatav@gmail.com**
Undergraduate Academic Level: **Sophomore**
Undergraduate Major and Expected Graduation Date: **Chemistry, 2019**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I'm interested in topics such as depression, addiction, and neurodegenerative diseases. I find the monoamine hypothesis fascinating. I believe that it's incredible how addiction exists, taking in consideration it's adverse consequences. I am also aware of the growing challenge that neurodegenerative diseases represent.

ENDURE Trainee Career Goals and Plan:

My aim is mathematical modeling. Simulations of systems that can be very approximately accurate. My intention is to continue towards grad school, and therefore, expanding my knowledge and the one I can impart. I wish to be part of the scientific community and to contribute in the search of empirical knowledge. I desire to share that knowledge with my community, as well as others, and break with the mythical wall that separates scientists from the rest of society.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Institute of Neurobiology**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Mark Miller**

ENDURE Research Project Title: **Localization of Caudodorsal Cell Hormone (CDCH)-like Immunoreactivity in the Central Nervous System of Biomphalaria spp, an Intermediate Snail Host for Intestinal Schistosomiasis.**

This parasitic disease schistosomiasis (snail fever) affects more that 200 million people in tropical countries worldwide. The pulmonate snail Biomphalaria spp serves as a major intermediate host for Schistosoma mansoni, the trematode worm that causes human intestinal schistosomiasis. It was observed previously that there is a dramatic reduction in the production of eggs in infected snails, and suggested that the parasites are able to redirect energy allocation toward their own transformation and multiplication. However, little is known about how parasitism may alter the reproductive behaviors of Biomphalaria spp. Bilateral clusters of caudodorsal cells (CDCs) are central neurons that primarily control female reproductive processes and behaviors in freshwater snails. In other species, CDCs were shown to control egg-laying by discharging an ovulation hormone termed caudodorsal cell hormone (CDCH). We propose that the reduction in egg-laying observed in infected snails could reflect parasite-induced decreased levels of CDCH. As little is presently known about CDCH in Biomphalaria spp, this study utilized standard immunohistochemical procedures to localize the peptide in the CNS. CDCH-like immunoreactive (CDCH-li) cells were located in specific ganglia and nerves of the Biomphalaria spp. The majority of the cells were located in clusters in the right and left cerebral ganglia (R Ce g., L Ce g.). Some cells were present in the right parietal ganglion (R Par g.) and pedal ganglia (Pd g.). Prominent CDCH-li fibers were observed in the cerebral commissure (C-c.), a known neurosecretory region between the two cerebral hemiganglia. The localization of these CDCH-li fibers is consistent with previous observations in other models, indicating that this hormone is secreted into the circulation and involved in the control of reproductive behaviors. Understanding the localization of CDCH in Biomphalaria spp will contribute to our knowledge of parasite-host interactions in this major biomedical model.

ENDURE TRAINEE ABSTRACT

ANA DEFENDINI

Home Institution and State: **University of Puerto Rico Rio Piedras, PR**
Email: **ana.defendini@upr.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology, May 2018**
Mentors/Advisors at Home Institution: **Dr. Carmen Maldonado, Dr. Jose Garcia**

ENDURE Trainee Scientific Interest:

My scientific research interests include neurobiology, drug addiction, and immunology. I am interested in studying the behavioral components of drug abuse, and how they can be explained through molecular changes. I have recently been inclined to studying how the immunological system is involved in drug responses and how it's response to drugs can help to explain abuse with drugs such as cocaine.

ENDURE Trainee Career Goals and Plan:

My career goal is to obtain an MD/PhD dual degree and pursue my medical degree as an immunologist, and my graduate degree in neurobiology. My objective is to study how the brain is affected by the immunological responses to many drugs, many of which can lead to drug addition, with the hopes of building a clinic that intertwines medicine and research to help people treat drug addiction and prevent it.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Vanderbilt University**

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title: **Changes in expression of dendritic spine-enriched neuronal proteins in the prefrontal cortex during adolescence**

Structural and functional alterations in the prefrontal cortex (PFC), including reduced spine density of PFC pyramidal cells, may contribute to the cognitive symptoms of schizophrenia. These are not only debilitating, but do not respond to current treatments. Studies suggest that aberrant developmental synaptic elimination during adolescence contributes to the reduced spine density of PFC pyramidal cells in schizophrenia. Recent data proposes that microglia are critically involved in synaptic elimination during early postnatal development. To better characterize the development of the PFC, which has a delayed and protracted maturation, we will examine the developmental expression pattern of neuronal proteins found in dendritic spines. Immunoblotting will be used to quantify levels of PSD-95 and spinophilin at postnatal days 30, 39 and 50. We expect the changes in neuronal protein levels to mirror the developmental pattern of spine density, which reach their peak density at P30, and thereafter decrease until a mature adult spine density is obtained. These studies serve as a foundation for future work aimed at understanding the processes governing developmental PFC synaptic elimination, considered being disrupted in schizophrenia, and which may contribute to cognitive symptoms.

ENDURE TRAINEE ABSTRACT

ABDIAS DIAZ

Home Institution and State: University of Puerto Rico-Recinto de Ciencias Médicas
Email: abdias415@gmail.com
Undergraduate Academic Level:
Undergraduate Major and Expected Graduation Date: Biology 2018
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I am interested in performing investigation in the field of Neuroscience. Through my last summer research experience, I worked with female rhesus macaque and how does the effects of SIV in prefrontal cortex affected the concentrations of Presynaptic and Postsynaptic proteins. My scientific interest is now leaning to the field of Neuroscience and the pathology of HIV.

ENDURE Trainee Career Goals and Plan:

At the actual moment one of my short-term goals is to graduate and obtain my bachelor degree and to apply to a graduate school. While doing that I think it would be very convenient for me to start investigating in a field related to what I expect my future be. On the other hand, some of my long-term goals are focused on doing an PhD in the branch of Neuropharmacology because I am sure that combining these two fields (Neuroscience and Pharmacology) I'll be able to contribute many important information to science. Since one of the biggest health problems we are now facing are related to brain disorders, I think it would be very good to approach the psychiatric field as an option of investigation.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: Recinto de Ciencias Medicas

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title: Early Effects of SIVmac251 at The Prefrontal Cortex of Rhesus Macaques Show a Diminished Concentration of Postsynaptic Proteins

Human Immunodeficiency Virus is a lentivirus that causes HIV infection and over time acquired immunodeficiency syndrome (AIDS). AIDS is a condition in humans in which progressive failure of the immune system allows life-threatening opportunistic infections that may lead to cancer and dead. Although the development of antiviral therapy to treat this disease has increased the rate of survival of these patients, HIV still has dreadful consequences, particularly among neural systems such as Human Immunodeficiency Virus Associated Neurocognitive Disorder (HAND). However, the mechanisms involved are largely unknown.

To address this issue, we studied the brains of rhesus macaques infected with the Simian Immunodeficiency Virus Mac 251. Brains were obtained from female macaques sacrificed at early stages post-infection (41 days) and donated to us by Drs. Montaner and Kraiselburd, we hypothesized that brains infected with SIV would show a decrease in synaptic contacts, and an increase in reactive astrocytes and in estrogen receptors in early stages of infection.

The prefrontal cortex, an area associated with higher cognition and abstract thinking, was dissected from macaques with a high SIV viral load, a low viral load and SIV free (n=3/group). Using Western Blot quantification, we measured the following proteins: (1) post-synaptic density 95 (PSD-95) (2) Synapsin (a presynaptic protein) (3) glial fibrillary acidic protein (GFAP) as a marker for astrocytosis and (4) estrogen receptors (as a marker for the neuroprotective hormone estradiol). Interestingly, we observed a decrease in PSD-95 in animals with a high viral load compared to SIV free macaques. Macaques with a low viral load

showed levels between high and SIV free macaques. No changes were observed in the other proteins measured.

Our data demonstrates that early stages of SIV infection are associated with synaptic damage, with postsynaptic proteins being more susceptible. These changes antecede changes in behavior or cognition. The lack of change in GFAP supports previous findings indicating that gliosis is present during late stages of HIV infection, those associated with encephalitis. These data partially support our hypothesis, that neural damage can be detected in early stages of SIV infection, and suggests that these changes may be a prequel to the appearance of HAND in more advanced stages of SIV infection.

ENDURE TRAINEE ABSTRACT

VICTORIA ENCARNACION

Home Institution and State: **University of Puerto Rico, Rio Piedras Campus, PR**
Email: **v.encarnacion05@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Chemistry, 2018**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

The field of neuroscience interests me because I want to use scientific knowledge as a tool in understanding addiction and behavior. Addiction research is still being explored and there are other factors involved. The addiction process involves other fields of study like psychology. Psychological factors contribute to this process and must be taken into account. The combination of both fields has led me to the curiosity and interest in neuropsychology research.

ENDURE Trainee Career Goals and Plan:

The experience that I have gained during college will aid me in my career as I pursue a Ph.D. in neuroscience. I am interested in research experience focused in addiction and behavior. My future goal consists in applying to graduate school, where many of my skills will be enhanced. It is also the opportunity where I could meet people with similar interest.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Puerto Rico, Medical Science Campus**

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title: **Hyperpolarization-Activated Cation Current (Ih) Channel Subunits HCN2: Role on the Development and Expression of Cocaine Behavioral Sensitization.**

Neuroadaptations induced by cocaine can modify neuronal excitability in the Mesocorticolimbic system (MCL), and can be involved in the development of cocaine sensitization. The hyperpolarization-activated cation current (Ih) has a potential regulatory role in neuronal excitability and is subjected to the expression of Hyperpolarization-Activated Cyclic-Nucleotide gated channel (HCN). We focused our study in the total protein expression of the HCN2 channel subunits in four regions of the MCL system: Ventral Tegmental Area (VTA), Hippocampus (HIP), Nucleus Accumbens (NAcc), and Prefrontal Cortex (PFC). In the present study we explore the changes in the expression of the HCN2 subunit at two timepoints: acute and following two consecutive cocaine exposures. Sprague Dawley male rats (250g) received intraperitoneal cocaine (15mg/kg) or 0.9% saline injections for one or two days. Rats were sacrificed, performed tissue micro-punches and protein extraction from four MCL regions and western blot analyzed. Results demonstrated that acute cocaine injections did not induce changes in total protein expression of the HCN2 subunit in the PFC and HIP, while VTA and Nacc total protein expression are still being explored. Following two days of cocaine injections, a significant increase in HCN2 subunit total protein expression was observed only in the VTA region.

ENDURE TRAINEE ABSTRACT

PAOLA FIGUEROA-DELGADO

Home Institution and State: **University of Puerto Rico, Río Piedras Campus**
Email: **paola.figueroa2@upr.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Molecular Cellular Biology; May 2018**
Mentors/Advisors at Home Institution: **Dr. José E. Garcia-Arrarás , Dr. Carmen S. Maldonado-Vlaar**

ENDURE Trainee Scientific Interest:

As an undergraduate student, I have been able to conduct research in engineering, life sciences, neuropathology and developmental neurobiology. I have found an interest in conducting research on neurodegenerative diseases and the epigenetic mechanisms that can give rise to said conditions. Furthermore, I have an interest in conducting research in defining molecular pathways during development that leads to differentiation of brain cells.

ENDURE Trainee Career Goals and Plan:

As an undergraduate, aside from obtaining a bachelor's degree in Molecular Cellular Biology and a minor in Computer Programming, I aim to develop and propel a Pilot Outreach Program (National Neuroscience Student Association) to increase multidisciplinary interest and knowledge in the field of Neuroscience. Therefore, building a collaborative network amongst universities nationwide and a Professional Development Center for those interested in pursuing a career in STEM. In addition, I plan on developing and establishing a working brain bank in Puerto Rico for academic and research purposes. I plan to obtain an MD/PhD, focusing research towards neuroscience and biomedical research. Furthermore, as a well-formed professional, I aim to integrate leading scientists of all fields in an international in-land research institute, collaborative amongst Nations (such as the International Space Station), in order to provide necessary resources and enhance student and growing professionals' potential as next generation pioneers.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Developmental Neurobiology Laboratory, University of Puerto Rico, Rio Piedras Campus**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. José E. García-Arrarás**

ENDURE Research Project Title: **INDUCING SODIUM ION CURRENTS TO DETERMINE THE ROLE OF THE NERVOUS SYSTEM IN INTESTINAL REGENERATION**

Several studies have shown a role of the nervous system in regenerative processes. Specifically, action potentials in excitable cells are known to be necessary, even to restore functional regeneration after pharmacological inhibition. Most studies on the nervous system's involvement in regeneration have been on amphibian limbs and tail (i.e. Xenopus). However, the involvement of the nervous system in visceral regeneration remains unclear. We have used the sea cucumber Holothuria glaberrima as a model to study nervous system effect in intestinal regeneration. In this model, the regenerating intestine arises as the mesenteries that held the intestinal track thickens, eventually forming the luminal epithelium and lumen. Studies on the model have shown the presence of an enteric nervous system comprised of serosal (mesothelial), connective tissue, and mucosal neuroendocrine plexus. Sodium ion currents were induced by injecting animals 1 day post evisceration (dpe) with monensin A M and sodium gluconate 90mM for 24 hours. Monensin A salt, isolated originally from Streptomyces cinnamonensis, is an ionophore with high-

selectivity to transport sodium ions into cells. Thus, directly moderating cellular sodium ion transport. At 5 dpe, mesenteries were fixed and whole mounts and histological slides were prepared. Immuno-histochemical techniques were used to analyze the tissues. Statistical analysis was provided by a nerve fiber quantification method amongst control and experimental animals. Histological findings denote no significant differences between monensin A treated and non-treated animals. Further evaluation and additional experimental phases are required to understand the role of sodium ions transport in H. glaberrima's viscera regeneration capability. Measurement of tissue transmembrane potential by use of DiBAC4(3) and intracellular sodium presence (CoroNa+ Green fluorescence) will be considered. Furthermore, use of a voltage-gated sodium channel inhibitor is highly suggested as it can provide information as to the importance of increased intracellular sodium in regeneration capabilities. Our study provides an insight on the effects the mesentery system undergoes when sodium transport is directly modulated by use of an ionophore (monensin A) and increasing the Na+ concentration (sodium gluconate).

ENDURE TRAINEE ABSTRACT

ALMARIS FIGUEROA-GONZALEZ

Home Institution and State: **University of Puerto Rico, Rio Piedras Campus**
Email: **almarissnhpr@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Cellular Molecular Biology- 2017**
Mentors/Advisors at Home Institution: **Dr. Carmen Maldonado and Dr. Jose Garcia Arrarás**

ENDURE Trainee Scientific Interest:

My interest in the neurosciences began when I learned the impact of drug abuse in the brain. Since then, I was fascinated with the neuroscience of drug addiction and other neuropsychiatric disorders. I am truly interested behavioral changes in response to the drug, the signal transduction mechanisms involved, the neurochemical substrates that participate and mediate the reward pathway, changes in signal processing, and nervous system responses of people with neuropsychiatric diseases such as anxiety, depression, or addiction. The subjects matters and interest me because of the social, scientific and psychological applications that it carries.

ENDURE Trainee Career Goals and Plan:

I'm a senior student pursuing a Bachelor degree in Cellular Molecular Biology at the University of Puerto Rico, Rio Piedras Campus. Currently, I work in Dr. Carmen Maldonado's laboratory. My research project "Intranasal OT reduces anxiety-like behaviors and elicits changes in endocannabinoid receptors within the mesolimbic system in cocaine-conditioned rats", aims to find an effective treatment for cocaine addiction. Our goal is to have this data published by May 2017. I am determined to earn a PhD in Neurobiology, stay in academia and continue to research the mechanisms that mediate psychiatric disorders.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Harvard Medical School**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Chundi Xu, Ivan J. Santiago, and Dr. Matthew Y. Pecot**

ENDURE Research Project Title: **Screening DIP-? expression in L3 neuron postsynaptic partners within the Drosophila visual system**

Understanding the molecular mechanisms of synaptic specificity remains a challenging question in neurobiology. In the Drosophila visual system, lamina neurons L1-L5 innervate the medulla, forming stereotyped connections with other neuronal subtypes. Previous studies showed that lamina neurons express unique combinations of Dprs, a subclass of immunoglobulin (Ig)-domain containing proteins. Dpr interacting proteins (DIPs) are expressed in subsets of lamina neuron synaptic targets raising the possibility that Dpr/DIP interactions are involved in the mechanisms that regulate synaptic specificity between neurons within the medulla. L3 neurons express Dprs 15, 16, and 17, all of which interact with DIP-?. Therefore, we set out to identify which postsynaptic partners of L3 express DIP-?. Using the GAL4/UAS gene expression system to label known L3 postsynaptic partners, and a fluorescent reporter recapitulating the DIP-? expression, we found that C3, TM5 and TM20 neurons express DIP-? in the adult fly brain. These results suggest that L3 terminals may identify C3, TM5 and TM20 postsynaptic dendrites via Dpr-DIP interactions.

ENDURE TRAINEE ABSTRACT

JOSE GORBEA

Home Institution and State: **University of Puerto Rico Rio Piedras, Puerto Rico**
Email: **josejgorbea@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology & Chemistry, June 2017**
Mentors/Advisors at Home Institution: **Dr. José Luis Agosto-Rivera**

ENDURE Trainee Scientific Interest:

I am interested in structural biology and biophysics. Specifically, I am interested in studying by experimental and theoretical approaches protein structure and protein interactions.

ENDURE Trainee Career Goals and Plan:

I plan on finishing my bachelor's degrees in biology and chemistry by June 2017 and moving on to start graduate school studying structural biology & biophysics. Eventually, I want to become an academic researcher.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Pennsylvania**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Kim A. Sharp**

ENDURE Research Project Title: **Simulations of proteins in reverse micelles**

Reverse micelle (RM) systems provide a powerful new approach in the investigation of proteins. When a combination of surfactant, cosurfactant and a small amount of water are mixed in a hydrophobic solvent, a RM can be formed. In particular, the combination of cetyltrimethylammonium bromide (CTAB), hexanol, water and pentane exhibits many advantageous properties for the study of encapsulated proteins. By using several computational methods a clearer picture of the inner dynamics, structure, and potential applications of this approach can be obtained.

Nanosecond length NAMD simulations were used to study empty RMs and RM's containing either ubiquitin or interleukin-1 beta with different water loadings. We examined different properties of the diverse RM systems including water dynamics, (diffusion constants for translational and rotational water motion and residence times around the protein), Lipari-Szabo structural order parameters (for methyl carbons and amides of the protein). We also compared calculated small angle x-ray and neutron scattering profiles for water, CTAB, and bromide with experimental scattering data. Through these studies we are better able to compound RM’s to study protein structure and dynamics and interpret measurements made on RM/protein systems.

ENDURE TRAINEE ABSTRACT

SONYA J. MALAVEZ CAJIGAS

Home Institution and State: **University of Puerto Rico Rio Piedras Campus, Puerto Rico**
Email: **sonyamalavez17@yahoo.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Nutrition & Dietetics, 2018**
Mentors/Advisors at Home Institution**: Dr. José García Arrarás**

ENDURE Trainee Scientific Interest:

At present, my current research is nervous system regeneration in a model invertebrate and how these studies may serve to learn and improve this capacity on humans. I am also interested in locomotion and what occurs in our body in order for it to happen or how it can be affected by diseases. Finally, I am a major in nutrition and I am interested in exploring new research areas, in particular those that combine nutrition and neuroscience and study the effect of diet on neural physiology and behavior.

ENDURE Trainee Career Goals and Plan:

My main career goal is to develop myself as a professional researcher that will contribute to a more advanced society. I plan to pursue a PhD in Neuroscience or Neuroscience combined with Physiology. In order to get there, I am currently completing a major in Nutrition and Dietetics and a minor in Biology. Upon successful completion of my undergraduate studies, I plan on entering a Doctoral program in Neuroscience at a top-rated university.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Puerto Rico Rio Piedras Campus**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. José García Arrarás**

ENDURE Research Project Title: **Effect of Gut Microbiota on the Enteric Nervous System of the Sea Cucumber**

The microbiota has been of great interest because of its vast effect on organism's well-being and health. We are now evaluating possible role of the intestinal microbiota on intestinal regeneration of the sea cucumber Holothuria glaberrima. The focus of the present work is the regeneration of the intestinal nervous system. Sea cucumbers regenerate most of their organs following evisceration, including the enteric nervous system. Our goal is to study the association between intestinal microbiota and the enteric nervous system. Initially, we have treated animals with the following antibiotics: Penicillin/Streptomycin, Erythromycin, Kanamycin and Neomycin to modulate the microbiota. Eviscerated animals were placed in sea water with various antibiotic dilutions and after 10 days of regeneration were sacrificed. Tissue sections were used for immunohistochemical analyses using nervous system markers (antibody RN1 and Beta-tubulin). Preliminary results suggest that antibiotics have a negative effect on regeneration by delaying the process.

ENDURE TRAINEE ABSTRACT

GIAN MOLINA

Home Institution and State: **University of Puerto Rico, Rio Piedras Campus, Puerto Rico**
Email: **gian.molina@upr.edu**
Undergraduate Academic Level**: Junior**
Undergraduate Major and Expected Graduation Date: **Cellular/Molecular Biology and Applied Statistics, May 2018**
Mentors/Advisors at Home Institution: **Dr. Carmen S. Maldonado-Vlaar**

ENDURE Trainee Scientific Interest:

Through the history of humanity, the understanding of the biological basis of brain function has been a great scientific question. My scientific and research interests in Neuroscience include behavioral neuroscience and neuropharmacology where I can contribute in the understanding of pharmacological interactions in the brain and its molecular and behavioral effects. Also, I am interested in mastering concepts and techniques in Neurophysiology in order to have a better understanding of the nervous system.

ENDURE Trainee Career Goals and Plan:

My goals include to continue developing my own research project and being able to publish a paper before finishing my Bachelor degree. After this achievement, my plans are to obtain a PhD in Neuroscience/Pharmacology from a biomedical research leading university where I can specialize in the most intriguing organ, the brain. This will guide me to face the novel challenges on neuropharmacology and make a significant contribution to the understanding of brain function. By this, I can contribute to advance the scientific knowledge and lead a transformation in the Neuroscience field.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Pennsylvania**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Heath Schmidt**

ENDURE Research Project Title: **Systemic Administration of a Glucagon-like Peptide-1 Receptor Agonist Attenuates Cocaine Seeking in Rats**

Emerging evidence indicates that glucagon-like peptide-1 receptor (GLP-1R) agonists, which are FDA approved for treating diabetes and obesity, regulate addiction-like behaviors in rodents. Administration of a GLP-1 agonist attenuates cocaine-induced self-administration, locomotion stimulation and conditioned place preference. However, the role of GLP-1Rs in cocaine craving-induced relapse remains unclear. We hypothesized that systemic administration of the GLP-1R agonist Exendin-4 would attenuate cocaine priming-induced reinstatement, an animal model of relapse. Rats self-administered cocaine (0.25mg/infusion, i.v.) for 21 days on a fixed-ratio (FR5) schedule of reinforcement. Cocaine self administration was then extinguished by replacing cocaine with saline. Once cocaine taking was extinguished, rats received an acute priming injection of cocaine (10 mg/kg, i.p.) to reinstate drug seeking behavior. During subsequent reinstatement sessions, rats were pretreated with vehicle or fluoro-Exendin-4 (3.0 ?g/kg, i.p.) 1 hour prior to a priming injection of cocaine. Systemic fluoro-Exendin4 administration significantly attenuated cocaine reinstatement and colocalized with astrocytes and neurons in the nucleus accumbens and VTA. Taken together, these results indicate that peripheral administration of a GLP-1R agonist is sufficient to reduce cocaine seeking and these effects are mediated, in part, by activation of central GLP-1Rs. The provocative findings suggest that GLP-1R agonists could be re-purposed for treating cocaine addiction.

ENDURE TRAINEE ABSTRACT

ALEXANDRA MARIA OGANDO VELEZ

Home Institution and State: **University of Puerto Rico, Rio Piedras, Puerto Rico**
Email: **ogandoalexandram@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology, 2017**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I have learned about HIV, with a special interest in HIV-1-associated neurocognitive disorders. I am intrigued by how an infection that causes progressive failure in the immune system can play a significant role in the health and integrity of the CNS. Currently, I am investigating how the protease cathepsin-B and its regulators might be potential biomarkers for HIV-associated-dementia in HIV-seropositive patients and how they contribute to neural dysfunction when unregulated and secreted by HIV-infected macrophages. Hopefully, this will provide a better understanding of the neuropathology that affects many HIV-infected people and its similarities with other neurodegenerative diseases, like Alzheimer's disease.

ENDURE Trainee Career Goals and Plan:

I have chosen to pursue an MD/Ph-D program. Through it not only will I get to help save lives through medicine, but I will also get to explore, create, and contribute knowledge in the scientific fields that most interest me, such as neurodegenerative diseases. I am aware that these are highly competitive programs, which is why I am currently studying extremely hard and learning as much research techniques as possible. This, along with the help of my mentors, will hopefully help me achieve my ultimate goals.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Penn State College of Medicine**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Jacqueline Barker**

ENDURE Research Project Title: **Characterizing cathepsin B/serum amyloid p complex-induced neuronal dysfunction in a mouse model of HIV-associated encephalitis**

HIV-infected macrophages infiltrate the blood brain barrier, triggering neuronal dysfunction and death. Despite antiretroviral therapy, HIV-associated neurocognitive disorders (HAND) remain prevalent. Infected macrophages secrete cathepsin-B, which interacts with serum amyloid p component (SAPC) extracellularly. Cathepsin-B and SAPC induce apoptosis of primary rat neurons in vitro, which is decreased by cathepsin-B and SAPC antibodies. Moreover, the levels of cathepsin-B internalization are proportional to the levels of HIV infection. Therefore, we hypothesize that targeting cathepsin-B/SAPC complex in MCM represents a viable approach to elucidate the mechanism of cathepsin-B-induced neuronal dysfunction and test its potential as a candidate for drug development against HAND. To test this, we exposed SK-N-SH cells to histidine-tagged cathepsin-B in neuronal culture media alone or in presence of anti-cathepsin-B antibody, and localized the histidine tag in neurons by flow cytometry. We also examined the presence of cathepsin-B and SAPC in the brain of a mouse model of HIV-encephalitis, generated by inoculation of control and HIV-infected human MDM. Cathepsin-B and SAPC were identified in the striatum of the mice with HIV-infected MDM by western blot, along with increased expression of cleaved caspase-3, compared to animals inoculated with uninfected MDM, validating the use of HIVE mice as an in vivo model.

ENDURE TRAINEE ABSTRACT

TARA MARINA ORTIZ-ITHIER

Home Institution and State: **University of the Sacred Heart, Puerto Rico**
Email: **tara.ortiz37@gmail.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Biology, 2018**
Mentors/Advisors at Home Institution: **Dr. Carlos A. Jimenez Rivera**

ENDURE Trainee Scientific Interest:

Drug availability has generated one of the biggest public health issues in Puerto Rico: substance use and abuse. Unfortunately, help for the approximately 60,000 drug dependent individuals is scarce. The situation is worsened by the popular belief that addiction is not a health problem, leading to the persistent systematic criminalization and social marginalization of addicts. This major health and social problem lead to my interest in addiction. Sponsored by ENDURE, I am currently integrated in a research laboratory that examines the pathophysiology of cocaine addiction. We observe for changes at the behavioral, electrophysiological and molecular levels during the development and expression of behavioral sensitization in rats. Hopefully our research will provide insights of the underlying mechanisms of addiction.

ENDURE Trainee Career Goals and Plan:

After I complete my biology major, I will pursue a neuroscience career in a research oriented academic institution. This research experience has solidified my goal of obtaining an M.D. Ph.D. focused on addiction research. I will actively address my professional and scientific development in order to become an accomplished scientific leader.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Puerto Rico- Medical Sciences Campus**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Carlos A. Jimenez Rivera**

ENDURE Research Project Title: **Role of PKMz and PKCi in cocaine sensitization**

I am investigating the protein expression profile of PKMζ and PKCi/λ at different time points of the sensitization process. This will allow the observation of how their expression changes with time and allow comparisons with protein expression of animals treated with an inhibitor of these proteins (ZIP). It was previously showed that PKCi/λ remains unaltered in the mesocorticolimbic system 24hrs after 5 days of cocaine administration. PKMζ expression increases in the Nucleus Accumbens (NAc) and the Hippocampus (Hipp). Here changes in expression after a withdrawal period were studied. Sprague Dawley Male Rats (250g) received intraperitoneal cocaine (15mg/kg) or 0.9% saline injections for 5 days and locomotor activity was recorded for 1hr. A 7-day withdrawal period was allowed. 24 hours later, rats were sacrificed and tissue micro punches of all four brain areas were subjected to protein extraction and western blot analysis. Preliminary data suggests an increase of PKMζ expression in the NAc and the Hipp. Further studies regarding PKCi/λ's role in LTP formation and if there is a dynamic interaction between PKCi/λ and PKMζ, will shed some light into the pathological mechanisms that underlie cocaine addiction.

ENDURE TRAINEE ABSTRACT

GABRIELA RODRIGUEZ

Home Institution and State: **Universidad Metropolitana, Puerto Rico**
Email: **grodrigurez372@email.suagm.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Biomathematics, 2018**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

My research interest incline towards the neuroscience field. I would like to focus my graduate research towards the neurodegenerative diseases area of neuroscience, specifically the behavior of the neuron circuits under the influence of mentioned diseases. Aside from the neurodegenerative field I am also interested in theoretical neuroscience and the mathematical modeling of circuits.

ENDURE Trainee Career Goals and Plan:

As soon as I graduate from my bachelor's degree in biomathematics I plan to pursue graduate studies in the area of neuroscience. Once in graduate school I am interested to center my PhD in the circuits of neurodegenerative diseases although I am aware that once I get there the direction of my research may shift; which is why I'm open to different possibilities like mathematical modeling, theoretical neuroscience among others. During my PhD. I would like to have at least a solid publication and once I finish my Ph.D. I would like to pursue a post-doc position, where I could further on my research.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Universidad de Puerto Rico, Rio Piedras Campus**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Jose Garcia-Arrarás**

ENDURE Research Project Title: **Repercussions of GlyCl Channel Modulation in H. glaberrima's Intestine Regeneration**

Regeneration can be defined as the reactivation of development in later life to restore missing tissue. It is known that the nervous system plays a certain role during this whole process. The voltage gradient in cell membranes serves as instructive signals regulating cell proliferation, differentiation and cell migration, key processes for regeneration. The standing gradients of these voltages along with the ion fluxes among cells serve as regulators for initiating the development of specific organs and the regeneration of whole appendages. In this investigation we aim to determine if the modulation of the GlyCl channel, known for mediating inhibitory and excitatory neurotransmission, has any repercussions in the regenerative ability of the H. glaberrima's intestine. The GlyCl channel, when activated, results in a Cl- flux that may cause either a depolarization or a hyperpolarization in the cell. Through the administration of a highly specific drug called Ivermectin we intend to open the GlyCl channel causing a hyperpolarization in the cells of the sea cucumber, leading to a disruption of the action potential and ultimately inhibiting the cell proliferation, among other processes. Through whole mounts we will be able to distinguish innervation of nervous filaments in the mesentery of the sea cucumber and identify if the hyperpolarization of the GlyCl channel inhibits this process. Also it will be possible to measure the SLS?s of the blastema and mesentery through Phalloidin staining in 20?m transversal cuts. Preliminary results from the transversal cuts of the intestine confirms the accuracy of the cryostat technique, validating the selection of methodology. However, we plan to explore more profoundly the effect of Ivermectin in the sea cucumber via in-vitro experimentation. A muscle cell extraction from the H.
Glaberrima's radial muscle will be cultured and treated with different conditions to explore if the drug has any effect on the morphology of the cells.

ENDURE TRAINEE ABSTRACT

RICARDO TORRES

Home Institution and State: **Inter American University of Puerto Rico Metro Campus**
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Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **BS Biology May 2018**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

What got me really interested in neurosciences is the behavior behind drug addiction. Understanding how the brain responds because of addiction and the search for a therapeutic treatment that would help diminish addiction and relapse. Due to my recent laboratory and personal experiences I also have found interest in neuropharmacology and cognitive neurosciences, because I would like to know more about mechanism of recent drugs that affect our cognitive abilities.

ENDURE Trainee Career Goals and Plan:

As an undergraduate student my plan is to enrich myself with laboratory experiences that will make me a competitive student for graduate school and to broaden my scientific knowledge through the laboratory and courses. In the long term I plan to obtain a Ph.D. in the field of neurosciences that I'm currently defining, through my lab experiences.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Puerto Rico Medical Sciences Campus**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Annabell Segarra**

ENDURE Research Project Title: **Early effects of SIV in female macaque brain tissue**

Human Immunodeficiency Virus is a lentivirus that causes HIV infection and over time acquired immunodeficiency syndrome (AIDS). AIDS is a condition in humans in which progressive failure of the immune system allows life-threatening opportunistic infections that may lead to cancer and dead. Although the development of antiviral therapy to treat this disease has increased the rate of survival of these patients, HIV still has dreadful consequences, particularly among neural systems such as Human Immunodeficiency Virus Associated Neurocognitive Disorder (HAND). However the mechanisms involved are largely unknown.

To address this issue, we studied the brains of rhesus macaques infected with the Simian Immunodeficiency Virus Mac 251. Brains were obtained from female macaques sacrificed at early stages post-infection (41 days) and donated to us by Drs. Montaner and Kraiselburd. We hypothesized that brains infected with SIV would show a decrease in synaptic contacts, and an increase in reactive astrocytes and in estrogen receptors in early stages of infection

The prefrontal cortex, an area associated with higher cognition and abstract thinking, was dissected from macaques with a high SIV viral load, a low viral load and SIV free (n=3/group). Using Western Blot quantification, we measured the following proteins: (1) post-synaptic density 95 (PSD-95) (2) Synapsin (a presynaptic protein) (3) glial fibrillary acidic protein (GFAP) as a marker for astrocytosis and (4) estrogen receptors (as a marker for the neuroprotective hormone estradiol). Interestingly, we observed a decrease in PSD-95 in animals with a high viral load compared to SIV free macaques. Macaques with a low viral load

showed levels between high and SIV free macaques. No changes were observed in the other proteins measured.

Our data demonstrates that early stages of SIV infection are associated with synaptic damage, with postsynaptic proteins being more susceptible. These changes antecede changes in behavior or cognition. The lack of change in GFAP supports previous findings indicating that gliosis is present during late stages of HIV infection, those associated with encephalitis. These data partially support our hypothesis, that neural damage can be detected in early stages of SIV infection, and suggests that these changes may be a prequel to the appearance of HAND in more advanced stages of SIV infection.

ENDURE TRAINEE ABSTRACT

SEBASTIAN VELAZQUEZ

Home Institution and State: **University of Puerto Rico Rio Piedras Campus, Puerto Rico**
Email: **sebastian.velazquez@upr.edu**
Undergraduate Academic Level: **B.S**
Undergraduate Major and Expected Graduation Date: **Biology, May 2017**
Mentors/Advisors at Home Institution: **Dr. José E. García Arrarás**

ENDURE Trainee Scientific Interest:

My research interest focuses on cellular and molecular neurobiology; particularly on protein structure, function and overall configuration. I am interested in working on the characterization of protein interactions and their relationship with malformations or aggregations that are associated to neurological diseases. Studies in this area of research have the potential of identifying specific sites of interaction. I believe that protein analyses techniques could be improved not only in neurological systems but in other systems to identify analog proteins and their functions.

ENDURE Trainee Career Goals and Plan:

My immediate career goal plan includes finishing my undergraduate education and obtaining outstanding research experiences in the field of Neuroscience. At the same time I will explore the path to continue graduate studies leading to a Ph.D. at a top mainland institution. I would like to focus my doctoral studies on protein interaction and methodologies that could give an insight in identifying a protein unknown ligand sites. I believe that by improving technological tools will advance the elucidation of these binding mechanisms and serve for the development of new potential therapies. My long-term plans are aimed at working in a leading academic research institution developing novel methods to identify key components of specific neurological diseases.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Puerto Rico Rio Piedras Camp**us

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. José E. García Arrarás**

ENDURE Research Project Title: **Novel marker to identify enteric progenitor cells of regenerated intestine in Holothuria glaberrima.**

The study of regeneration and stem cells have dramatically increased in recent years. In our laboratory, we study regenerative processes using an echinoderm model, the sea cucumber Holothuria glaberrima. This organism is well known for its regenerative properties. In our quest, we have developed a monoclonal antibody (EN1) that labels a specific cell type mainly found in certain regeneration stages during regeneration of the intestine. In this study we have clearly determined the tissues and stages where it is express and have begun to characterize the protein component that is labeled by the antibody. Thus, we are using molecular methodologies to extract, purify and finally sequence the protein component present in these cells. We expect that the new advances and technology developments will help determine the regeneration mechanisms used by H. glaberrima and that the elucidation of these mechanisms will benefit humans in their quest for improving health issues.

TENNESSEE STATE UNIVERSITY-NEUROSCIENCE EDUCATION AND RESEARCH VANDERBILT EXPERIENCE (TSU-NERVE)

TENNESSEE STATE UNIVERSITY
Principal Investigator: *Dr. Kiesa Kelly*
Partner Institutions: Vanderbilt University

PROGRAM DESCRIPTION:

The TSU-NERVE program in partnership with Vanderbilt University will prepare underrepresented students majoring in STEM disciplines at Tennessee State University, a Historically Black College and University, for graduate study and careers in Neuroscience.
The TSU NERVE program will provide quality research, didactic, and professional development opportunities to support programmatic initiatives and goals: free Neuroscience courses, seminars, and retreats at Vanderbilt University; a 6-part Workshop series on graduate school admissions that will involve directors of Neuroscience doctoral programs from around the country; a 3-semester Neuroscience research seminar course; research experiences in Vanderbilt Neuroscience labs during the academic year; and summer research experiences at Vanderbilt or one of three T32-funded Neuroscience institutions (U. of Michigan, U. of Minnesota, and Oregon Health and Science University) with which a partnership has been formed.

Carefully crafted retention plans will maximize TSU-NERVE trainee completion and success. These include: 1) a Vanderbilt Teaching Assistant to tutor students in rigorous Vanderbilt Neuroscience coursework, 2) Vanderbilt graduate student mentors who will work with each TSU-NERVE student in his/her academic year lab placements, and 3) individual mentoring and advising from program directors that include evaluation of participant progress. Among enrolled TSU students, TSU-NERVE draws from the University Honors Program and TSU's NSF-funded HBCU-Undergraduate Programs for STEM majors.

TSU-NERVE will: 1) recruit talented STEM majors from TSU interested in Neuroscience, 2) provide appropriate support and scaffolding for these students as they receive quality research and didactic experiences at major research institutions, and 3) advance students from underrepresented backgrounds into doctoral programs in Neuroscience with well-crafted professional development activities. Well-conceived admissions and retention plans will increase completion rates. Additionally, comprehensive formative and summative assessments will be conducted in both program evaluation and the career development of trainees to ensure the success of the TSU-NERVE program.

ADDITIONAL PROGRAM TEAM MEMBERS:

Dr. David Zald – Co- Investigator, Vanderbilt University
Dr. Lisa A. de la Mothe – Co-Program Director, Tennessee State University
Dr. Hugh Fentress – Co-Program Director, Tennessee State University

ENDURE TRAINEE ABSTRACT

ERIN CHATMAN

Home Institution and State: **Tennessee State University, Tennessee**
Email: **echatma1@my.tnstate.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology, May 2017**
Mentors/Advisors at Home Institution**: Dr. Lisa de la Mothe, Dr. Hugh Fentress**

ENDURE Trainee Scientific Interest:

My main research interests are psychological and neurological disorders; however, I am also interested in sleep and its role in memory consolidation. I would like my research to focus on women, minorities, or other underrepresented populations.

ENDURE Trainee Career Goals and Plan:

After receiving my bachelor's degree in psychology, I plan on further developing my research and laboratory skills by seeking a job as a lab manager or research assistant. Once I have developed those skills further, I plan on applying for a Ph.D. program in either Clinical Psychology or Clinical Neuroscience. Ideally, I would like to work in a hospital or university setting under a researcher whose work aligns with my research goals and focuses on women or minorities.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Princeton University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Ken Norman**

ENDURE Research Project Title: **The Effects of Images on Emotional Memory**

My project goal was to examine how people's emotional responses to images affects their memory for those images. The study consisted of three phases. Phase one was the study phase in which participants were asked to view and study 64 scenes composed of a negative or neutral object against a neutral background. A related sound would accompany each image. Phase two was the nap phase. Participants would be connected to an EEG machine and asked to sleep for 90 minutes. During the participants' naps, the sound cues they heard during the first phase would be played again. In the final phase of the study, participants were asked to take a recognition task and pick out the images they had seen previously in the study, with 64 new objects and scenes being added. Our prediction is that participants would remember negative images better due to auditory cueing and emotional salience.

ENDURE TRAINEE ABSTRACT

ROMIN GEIGER

Home Institution and State: **Tennessee State University, Tennessee**
Email: **rgeiger@my.tnstate.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology (Exp. May 2017)**
Mentors/Advisors at Home Institution: **Dr. Lisa de la Mothe, Dr. Hugh Montrell Fentress**

ENDURE Trainee Scientific Interest:

Recently, my research background has focused on neuroscience research, and I am really interested in researching how children learn, specifically minorities, in highly stressful situations and how this affects their brain development. In graduate school, I would like to apply my research experiences to methods of recording differences in the participants, particularly using EEG and fNIRS to trace differences in minorities in stressful settings and minorities in less stressful settings.

ENDURE Trainee Career Goals and Plan:

With the support of the ENDURE program, I plan to pursue a PhD in Psychology, with an emphasis in Neuroscience. I am interested in how children learn and I hope to investigate different methods of teaching that provide the most effective ways for children to learn despite learning disabilities or differences in socio-economic status

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Princeton University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Lauren Emberson**

ENDURE Research Project Title: **FNIRS Uncovers Differences in Top-Down Feedback During Learning in Premature Infants**

Although previous work has explored how neural responses in the infant brain change over the course of learning, we have yet to explore these patterns in infants with potential for impaired neuro-cognitive abilities. Here, we chart patterns of activation in both premature and full-term infants during learning of audiovisual stimuli. Using functional near-infrared spectroscopy (fNIRS) to record hemodynamic responses in three regions of the infant brain (temporal, occipital and frontal cortex) in both premature and full-term infants, we find a strikingly different pattern of activation in the occipital cortex between the two groups. Furthermore, we find that the likelihood of a difference in activation between premature and full-term infants in the occipital lobe during visual omission trials can be significantly affected by prematurity. We also found that using the full set of infants the shape of the learning timecourse significantly predicted the infant's neural response during visual omission trials (both within and between ROIs). The data provided provides a first look at using fNIRS to map patterns of neural response during the course of audiovisual learning in two groups of infants in diverse regions of the infant brain, providing significant evidence that prematurity has an effect on infant associative learning.

ENDURE TRAINEE ABSTRACT

JORDYNE JACKSON

Home Institution and State: **Tennessee State University**
Email: **jjacks73@my.tnstate.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology (Exp. May 2017)**
Mentors/Advisors at Home Institution: **Dr. Lisa A. De la Mothe, Dr. Hugh Fentress**

ENDURE Trainee Scientific Interest:

My interests focus mainly on mental illnesses and mental health. I am interested in preventative measures as well as treatment. With the help of the BP Endure program, I hope to be able to obtain my Ph.D. in clinical neuropsychology and conduct research diagnoses, treatment, and potential interventions for people who suffer from these disorders.

ENDURE Trainee Career Goals and Plan:

Upon graduation I plan to pursue a PhD in clinical neuropsychology in order to work with patients with various neurological disorders and conduct research that can be used to inform treatment and interventions. My career goal is to become a practicing clinical neuropsychologist with an emphasis on children and adolescents.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Princeton Neuroscience Institute**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Yael Niv and Dr. Nicolas Schuck**

ENDURE Research Project Title: **Human Orbitofrontal Cortex Represents a Cognitive Map of State Space**

This research project focused on reinforcement learning, attention and decision-making. The study researches how the orbitofrontal cortex reacts while taking a certain computer task composed of faces and houses. The activity in the orbitofrontal cortex was recorded through neuroimaging in an fMRI machine. Our study expanded upon previous work by examining the impact of rewards and how the brain reacts to rewards and reinforcement learning.

ENDURE TRAINEE ABSTRACT

RENITA JONES

Home Institution and State: **Tennessee State University, Tennessee**
Email: **rjones34@my.tnstate.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology, May 6, 2017**
Mentors/Advisors at Home Institution: **Dr. Lisa A. de la Mothe, Dr. Hugh Fentress**

ENDURE Trainee Scientific Interest:

I am interested in exploring the neurological and psychological origins of psychosis. A break in reality has a variety of factors that may influence the development such as prolonged stress or abnormal chemical levels in the brain. I would like to examine ways to differentiate the neurological and psychological basis of psychosis, and develop more efficient treatments.

ENDURE Trainee Career Goals and Plan:

My future endeavors include going on to pursue a doctoral degree in either clinical psychology or clinical neuroscience. I would like to be able to apply my research findings for treatments for those who may suffer from a neurological or psychological disorders.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution**: Princeton University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Casey Lew-Williams, Dr. Elise Piazza**

ENDURE Research Project Title: **How do environmental sounds influence language processing?**

We are interested in language processing and development in children. Our goal was to determine how fast children process language using their knowledge of environmental sounds. For example, if a child hears birds chirping, would he/she be more likely to recognize the word “stick” faster than if he/she were to hear the same word while listening to the sounds of a bathroom, where he/she would not be as likely to encounter a stick? This project posed the question, “do children use the sounds in their environment to learn new words?” To measure language comprehension, we tracked the eye movements of 18-month old babies as we presented them with a sound that is congruent to a specific location. The project is in its beginning stages, and no significant amount of data has been collected to form a conclusion. We predict that children process words faster when they are presented in a typical auditory context.

ENDURE TRAINEE ABSTRACT

IDRIS KOSOKO

Home Institution and State: **Tennessee State University**
Email: **ikosoko1@my.tnstate.edu**
Undergraduate Academic Level**: Junior**
Undergraduate Major and Expected Graduation Date: **Biology (May 2018)**
Mentors/Advisors at Home Institution: **Dr.Lisa de la Mothe, Dr. Hugh Fentress**

ENDURE Trainee Scientific Interest:

I am interested in a variety of interest areas, but I am particularly interested in the study of Addiction and focusing on the reward system in relation to substance abuse.

ENDURE Trainee Career Goals and Plan:

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution**:**

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title:

I will be conducting a research experience beginning summer 2017.

ENDURE TRAINEE ABSTRACT

ZAKIA LOWERY

Home Institution and State: **Tennessee State University, Tennessee**
Email: **Zlowery@my.tnstate.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Biology, May 2018**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I am interested in a variety of neurological disorders and understanding their neural mechanisms including epilepsy, alzheimer's, autism, and schizophrenia.

ENDURE Trainee Career Goals and Plan:

Upon graduating from Tennessee State University, I plan to attend a doctoral program in clinical psychology or clinical neuroscience. My career goal is to work as a clinical neuropsychologist in my own practice or a hospital.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Vanderbilt University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Mark Wallace, Dr. Sarah Baum**

ENDURE Research Project Title: **The Effect of a Speech Training Paradigm on the Temporal Binding Window**

If two stimuli are presented within a certain time range, known as temporal binding window, they are highly likely to come from a single multisensory event. This window is different for each person and has the capacity to be manipulated. In this study, it is hypothesized that the experiment group after training will have a narrower temporal binding window than those of the control group who received no training. To conduct this experiment, college students were recruited to participate in a four-day study. The tasks consisted of subjects viewing four blocks of a woman saying the syllable “ba”, and determining if what they heard (voice) and saw (lip movements) occurred simultaneously. Subjects were randomly assigned to a test group. The experiment group was presented with feedback that told them whether or not their answer was correct; the control group was presented with the same number of trials but received no feedback. Results show that those with training had a binding window that continued to narrow each day, while those without training remained the same. Clinical applications of this work include autism research. (Stevenson et al., 2015; Wallace & Stevenson, 2014) Individuals with autism have a wider temporal binding compared to typically developing children, which may cause them to incorrectly bind two stimuli together. If a person can be trained to have a narrower temporal binding window, the same training will be applied to children with autism in hopes that the training will be effective on them as well, leading to the ability to more efficiently process what they see and hear.

ENDURE TRAINEE ABSTRACT

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ENDURE Trainee Scientific Interest:

Behavioral Neuroscience. Specifically, the long-term effects of adverse childhood experiences on brain function.

ENDURE Trainee Career Goals and Plan:

My career goals are to obtain a Ph.D. in Behavioral Neuroscience or Psychology and become a child psychologist. I then want to research and implement prevention based programs for children and parents so that communities are more aware of the factors influencing development of mental disorders specifically among children. I am also interested in providing communities with information to better understand those children who do develop mental disorders.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Wright State University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. David Ladle**

ENDURE Research Project Title: **Analysis of the development of proprioceptive cell size in mice**

Proprioception is the sense of awareness of one's own body position. There are two general classes of sensory neurons (group I and group II) that produce signals used to calculate proprioception. Previous studies have shown that group I neurons have axons with larger diameters in adult mice while group two are slightly smaller in comparison. However, it is unknown if there is a difference in the cell soma size that correlates with these axon differences. No studies have analyzed cell size through a developmental stance. In this study, the diameter of proprioceptive cells taken from the lumbar dorsal root ganglion (DRG) was measured throughout different postnatal ages in mice development. Resulted implicate that cell size increases with age.

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ENDURE Trainee Scientific Interest:

I really enjoy working with children and understanding more about their neural development. I am also interested in the effects of medicines and other substances on the brain and the relationship to mental illness as well as neuropharmacology in general.

ENDURE Trainee Career Goals and Plan:

I am interested in pursuing a doctoral degree in Clinical Psychology or Clinical Neuroscience with research on emphasis on children and adolescence. I would like to understand more about the development of the childhood brain and how this translate to particular behaviors and mental illnesses.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution:

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title:

I will have my initial summer research experience beginning Summer 2017.

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ENDURE Trainee Scientific Interest:

My scientific interests include cognitive and behavioral neuroscience with a forensic focus. I am also interested in decision making, mental illness and human sexuality.

ENDURE Trainee Career Goals and Plan:

After completing my undergraduate studies, I intend to pursue a graduate level degree in Neuroscience. From there, I look forward to working in the field of forensic neuroscience.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: N/A

Mentors/Advisors at ENDURE Summer Research Experience Institution: N/A

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ENDURE Trainee Scientific Interest:

My scientific and research interests include psychopathology, neuropsychology, clinical psychology and neuroimaging.

ENDURE Trainee Career Goals and Plan:

My career goals for the future include eventually obtaining either a Ph.D. in clinical psychology, neuropsychology or psychopathology. I anticipate a career in which she can conduct translational research that includes devoting oneself to patient care.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Vanderbilt University**

Mentors/Advisors at ENDURE Summer Research Experience Institution**: Dr. David Zald**

ENDURE Research Project Title: **Investigation of Age-Related changes in Volume and D2/3 Receptor Availability in the Substantia Nigra and Ventral Tegmental Area**

Age-related loss of dopaminergic signaling is of special concern due to implications in the neurodegenerative disorder Parkinson's disease where the substantia nigra (SN) dopamine neurons die at a high rate leading to lower striatal dopamine signaling. Furthermore, examination of normal agerelated declines in dopaminergic signaling in the midbrain has been limited by the inability of the widely-used radiotracer 11C-raclopride to measure D2/3 receptor availability (binding potential, BPnd) in this area of the brain, which includes the SN and ventral tegmental area (VTA). Given the small size and variability in localizing the SN and VTA, defining these structures using each participant's anatomy is crucial to obtaining accurate BPnd measurements. In this study, we analyzed 18F-Fallypride D2/3 BPnd in 64 participants' individually derived SN and VTA using a published midbrain tracing guide. We determined effects of age on volume and BPnd in both SN and VTA. Furthermore, after controlling for SN and VTA volume, we still observed age-related declines in BPnd, suggesting declines in BPnd could not be attributed solely to loss of dopamine neurons. Our results suggest general receptor availability loss in SN/VTA occurs with age reflecting lower D2-autoreceptor control of dopamine release.

COMPLETE ENDURE STUDENT ACTIVITIES AT SFN: November 12-15, 2016

FRIDAY Nov 11	4:00 – 7:00pm Building an ENDURing Network **First Annual BP-ENDURE SfN Kick-Off Event** **3:00 – 3:30pm Loading Buses at Pickup Point for 3:30pm departure at Convention Center** *Shuttles will be waiting at the convention center in front of Hall D/lobby area* **4:00 – 4:30pm Light Appetizers and Refreshments, Name Badge Icebreaker** **4:30 – 4:40pm Opening remarks** **4:40 – 5:00pm Welcome and Introduction to UCSD** **5:00 – 5:10pm The Week Ahead: Getting the Most Out of SfN** **5:10 – 5:30pm UCSD Graduate Student Science Talk** **5:30 – 5:45pm Refreshment Break** **5:45 – 6:30pm ENDURE "Shark Tank": Selling the Science and Yourself** **6:30 – 6:45pm Closing Remarks and Final Building of New Connections** **6:45 – 7:00pm Prepare for bus and departure from UCSD to Convention Center** **7:30 pm Arrive at Convention Center**
SATURDAY Nov 12	7:00 – 11:30 am **6TH ANNUAL NIH BLUEPRINT ENDURE MEETING** Manchester Grand Hyatt San Diego, Harbor Ballroom ABC **(1 Market Pl, San Diego, CA 92101)** **7:00 – 7:30 am Registration** **7:30 – 9:45 am Featured Speakers** **9:45 – 11:30 am T32 Recruitment Fair and Networking** 1:00 – 3:00pm **GRADUATE SCHOOL FAIR** Location: SDCC Sails Pavilion **Meet face-to-face with student advisors, program faculty, and graduate school representatives at the Graduate School Fair.** 6:30 – 8:30pm **DIVERSITY FELLOWS POSTER SESSION** Location: SDCC Hall A 7:30 – 9:30pm **CAREER DEVELOPMENT TOPICS: A NETWORKING EVENT** Location: SDCC Hall A **Experienced neuroscientists will offer advice on a wide range of topics in an informal, roundtable format. Topics include work-life balance, securing grants, career transitions, careers away from the bench, choosing graduate schools and postdoctoral fellow positions, and many others. Participants from diverse backgrounds, fields, and work sectors are encouraged to attend.**

COMPLETE ENDURE STUDENT ACTIVITIES AT SFN: November 12-15, 2016

SUNDAY Nov 13	MORNING AND AFTERNOON Attend Scientific Program •Featured lectures •Symposia •Special lectures •Minisymposia Plan Your Itinerary for Neuroscience 2016 12:00 – 2:00pm GRADUATE SCHOOL FAIR Location: SDCC Sails Pavilion Meet face-to-face with student advisors, program faculty, and graduate school representatives at the third annual Graduate School Fair.
MONDAY Nov 14	MORNING AND AFTERNOON Attend Scientific Program •Featured lectures •Symposia •Special lectures •Minisymposia Plan Your Itinerary for Neuroscience 2016 12:00 – 2:00pm GRADUATE SCHOOL FAIR Location: SDCC Sails Pavilion Meet face-to-face with student advisors, program faculty, and graduate school representatives at the third annual Graduate School Fair. 7:00 – 8:00pm DIVERSITY IN NEUROSCIENCE RECEPTION Location: Marriott Marquis Marina E South Tower
TUESDAY Nov 15	MORNING AND AFTERNOON Attend Scientific Program •Featured lectures •Symposia •Special lectures •Minisymposia Plan Your Itinerary for Neuroscience 2016 12:00 – 2:00pm GRADUATE SCHOOL FAIR Location: SDCC Sails Pavilion Meet face-to-face with student advisors, program faculty, and graduate school representatives at the third annual Graduate School Fair.

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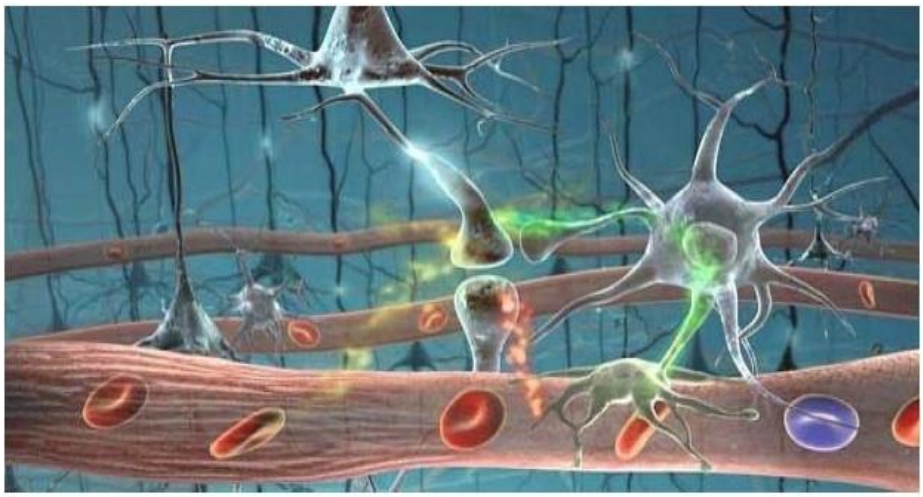

THANK YOU FOR YOUR PARTICIPATION