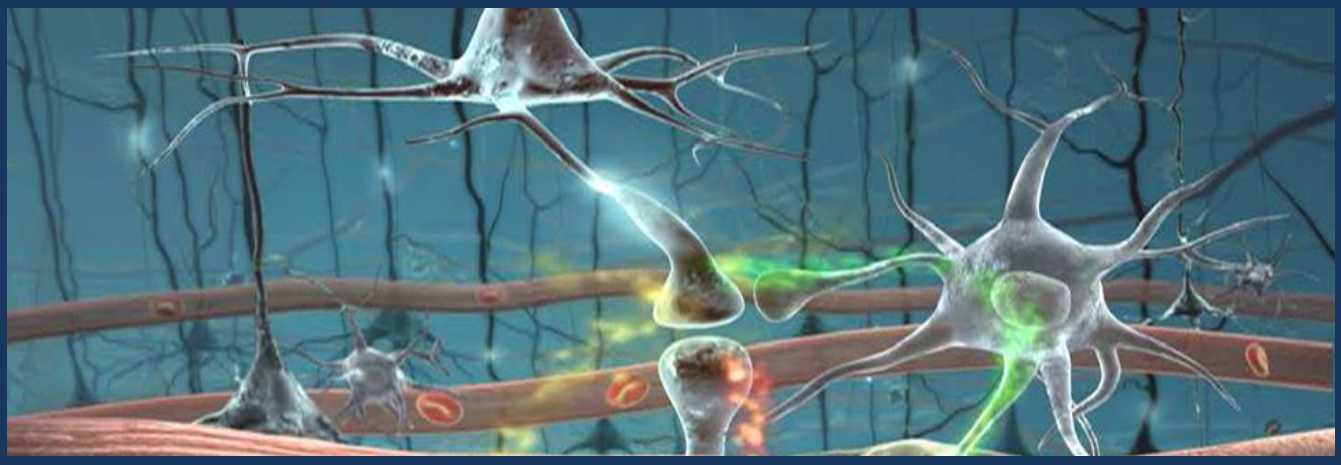
ENDURE

NIH Blueprint for Neuroscience Research



7th Annual Enhancing Neuroscience Diversity through Undergraduate Research Education Experiences (ENDURE) Meeting

November 11, 2017
Washington, DC

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

- NCATS
- NCCIH
- NEI
- NIA
- NIAAA
- NIBIB
- NICHD
- NIDA
- NIDCR
- NIEHS
- 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 FY10, five ENDURE awards were granted. In FY15, 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. Mark Chavez (NIH/NIMH)

Dr. Edgardo Falcon-Morales (NIH/NINDS)

Dr. Lauren Ullrich (NIH/NINDS)

Stephanie Powell (NIH/NIMH)

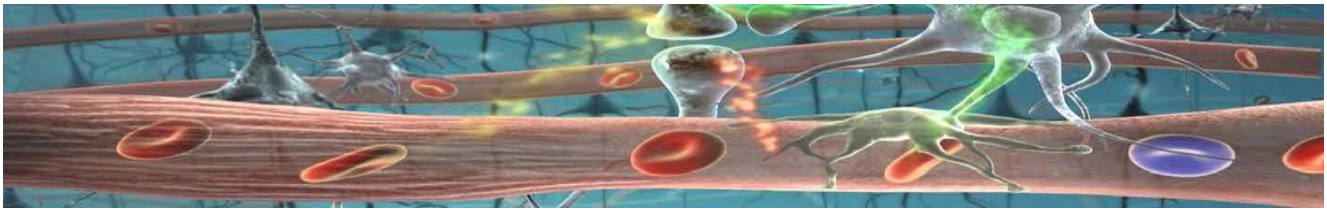
Karen Gibson-Serrette (Longevity Consulting)

Anika Smith (Longevity Consulting)

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

Follow NINDS Diversity on Twitter **@NINDSDiversity**



Enhancing Neuroscience Diversity through Undergraduate Research Education Experiences (ENDURE) 7th Annual Meeting

Renaissance Washington DC Downtown Hotel, Renaissance Ballroom East
November 11, 2017

7:00 – 7:30 am Registration

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

Dr. Michelle Jones-London, Chief, Office of Programs to Enhance Neuroscience Workforce Diversity (OPEN), National Institute for Neurological Disorders and Stroke (NINDS)

7:40 – 8:05 am NIH Blueprint Welcome and Scientific Presentation

Dr. Joshua Gordon, Institute Director, National Institute of Mental Health (NIMH)
Q&A

8:05 – 9:45 am Panel on "Pathways and Perspectives on Being a Researcher"

Chair and Panel Introductions: *Dr. Mark Chavez*, Division of Adult Translational Research and Treatment 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

- Dr. Steve Ramirez – Assistant Professor of Neuroscience, Boston University
- Dr. Jennifer C. Tudor – Assistant Professor of Biology, Saint Joseph's University
- Dr. Amanda Brown– Associate Professor, Department of Neurology, Johns Hopkins School of Medicine

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 with various neuroscience NIH Institutes of common pitfalls for trainees, such as:

- Developing biosketches that make sense and show the best "you" (bring your own biosketch!)
- How to obtain strong recommendations that convince reviewers to invest money in you
- Advice on writing a competitive career development plan

NIH BLUEPRINT FOR NEUROSCIENCE RESEARCH

The NIH Blueprint for Neuroscience Research, known as "Blueprint", is a collaborative framework that includes the NIH Office of the Director and 14 NIH Institutes and Centers that support research on the nervous system. By pooling resources and expertise, Blueprint identifies cross-cutting areas of research, and confronts challenges too large for any single Institute or Center.
Blueprint makes collaboration a day-to-day part of how the NIH does business in neuroscience, complementing the basic missions of Blueprint partners.

Blueprint Fact Sheet: http://bit.ly/2y17NTr

This year's NIH Blueprint welcome is presented by Dr. Joshua Gordon, NIMH Director

Joshua A. Gordon, MD, PhD
Director, National Institute of Mental Health
National Institutes of Health

Dr. Gordon received his MD, PhD degree at the University of California, San Francisco and completed his Psychiatry residency and research fellowship at Columbia University. He joined the Columbia faculty in 2004 as an Assistant Professor in the Department of Psychiatry where he conducted research, taught residents, and maintained a general psychiatry practice. In September of 2016, he became the Director of the National Institute of Mental Health.

Dr. Gordon's research focuses on the analysis of neural activity in mice carrying mutations of relevance to psychiatric disease. His lab studies genetic models of these diseases from an integrative neuroscience perspective, focused on understanding how a given disease mutation leads to a behavioral phenotype across multiple levels of analysis. To this end, he employs a range of systems neuroscience techniques, including *in vivo* anesthetized and awake behaving recordings and optogenetics, which is the use of light to control neural activity. His work has direct relevance to schizophrenia, anxiety disorders, and depression.

Dr. Gordon's work has been recognized by several prestigious awards, including the The Brain and Behavior Research Foundation – NARSAD Young Investigator Award, the Rising Star Award from the International Mental Health Research Organization, the A.E. Bennett Research Award from the Society of Biological Psychiatry, and the Daniel H. Efron Research Award from the American College of Neuropsychopharmacology.

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.

Steve Ramirez, PhD

Assistant Professor
Boston University

Steve Ramirez is an Assistant Professor of Neuroscience at Boston University and a Junior Fellow at Harvard University. He received his BA in neuroscience from Boston University and began researching learning and memory in the laboratory of Howard Eichenbaum. He went on to receive his PhD in neuroscience in the laboratory of Susumu Tonegawa at MIT, where his work focused on artificially modulating memories in the rodent brain, and his current work focuses on leveraging these manipulations to alleviate symptoms associated with psychiatric diseases. Steve has also received the Smithsonian's American Ingenuity award, National Geographic's Breakthrough Explorer prize, Forbes and Technology Review's Top 35 Innovators Under 35 award, and has given two TED talks.

Jennifer C. Tudor, PhD

Assistant Professor of Biology
Saint Joseph's University

Dr. Tudor is an Assistant Professor of Biology in the College of Arts and Sciences at Saint Joseph's University in Philadelphia, PA. Born with spina bifida, her interest in neuroscience began at an early age as she tried to understand her disability. During her undergraduate studies at Stony Brook University, her interests expanded to include sleep and memory conducting research with Dr. Nancy Squires at Stony Brook University. During the summer of 2003, she also spent a summer as a William C. Dement sleep research apprentice at Brown University with Dr. Mary Carskadon. After Stony Brook, Dr. Tudor attended New York University's Sackler Institute of Graduate Biomedical Studies working with Dr. Paul Mathews at the Nathan Kline Institute's Center for Dementia Research. Dr. Tudor received an NIA NRSA predoctoral fellowship, which proved highly fruitful studying neuronal endocytic abnormalities in Down syndrome and Alzheimer's disease mouse models. She defended her dissertation in September 2010 and subsequently moved to the University of Pennsylvania to begin her appointment as a PENN-Postdoctoral Opportunities in Research and Teaching (PENN-PORT) Postdoctoral fellow. The PENN-PORT program has provided her the opportunity to teach at Rutgers University Camden. Additionally, this fellowship expanded her repertoire of bench techniques under the guidance of Dr. Ted Abel, an internationally renowned leader in the field of learning and memory and sleep research. Her research with Dr. Abel was also supported by an NIMH NRSA postdoctoral fellowship after her tenure as a PENN-PORT fellow. Since her postdoctoral years, Dr. Tudor's research has focused on understanding the impact of sleep and disease on protein synthesis signaling pathways. Her new laboratory at Saint Joseph's University continues this focus. She has previously published under Jennifer H. K. Choi. Outside the lab, Dr. Tudor and her husband enjoy swimming, traveling, skiing, and SCUBA diving. She also sings and plays several musical instruments for various organizations.

Amanda M. Brown, PhD
Associate Professor
Department of Neurology
Johns Hopkins University School of Medicine

Dr. Brown joined the Department of Neurology at Johns Hopkins University School of Medicine in 2004, working her way up the faculty ranks and was promoted to Associate Professor in December 2016. Her current research interests — funded by the NINDS — are centered on identifying the mechanisms and consequences of HIV-induced proinflammatory signaling in the central nervous system.

She completed a bachelor's degree in biochemistry at the University of California Riverside and obtained a PhD in microbiology/immunology at the Albert Einstein College of Medicine and entered the field of HIV through a postdoctoral fellowship at the Aaron Diamond AIDS Research Center, where she developed innovative tools to study HIV-macrophage biology and persistent and latent infection of these cells. Her group identified osteopontin, a multifunctional extracellular matrix protein as a putative link between persistent inflammation in the brain and cognitive impairment in HIV-infected individuals. Her lab is currently using humanized mice and in vitro approaches to identify the critical cellular pathways and the molecular mechanisms involved.

Dr. Brown serves for the following NIMH-funded programs, as Co-Director for the Developmental Core of the Johns Hopkins Center for Novel Neurotherapeutics, which promotes innovative translational research projects, Co-Director of Translational Research in NeuroAIDS and Mental Health to promote diversity in the neuroaids workforce, and Director of Project Pipeline Baltimore, a summer program, which provides hands-on research and professional development experiences for URM high school students in Baltimore City and the surrounding metropolitan area. For her mentoring and training efforts related to increasing diversity in STEM, she was in 2014 recognized with the Diversity Leadership Council award.

T32 RECRUITMENT FAIR PARTICIPANTS

University/School	Representative
BROWN UNIVERSITY	**Gilad Barnea, PhD** Associate Professor of Neuroscience **Anne C. Hart, PhD** Professor of Biology **David Sheinberg, PhD** Professor
GEORGETOWN UNIVERSITY	**G. William Rebeck, PhD** Professor **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
ICAHN SCHOOL OF MEDICINE AT MOUNT SINAI	**George W. Huntley, PhD** Professor
JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE	**Anna Chang** Graduate Student **Solange Brown, MD, PhD** Assistant Professor **Jay Baraban, MD, PhD** Professor of Neuroscience, Head of Diversity Committee
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
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 **Jonathan Cohen, PhD** Professor **Laura Bustamante** Graduate Student
STANFORD UNIVERSITY	**John Huguenard, PhD** Professor of Neurology and Neurological Sciences **Anthony Ricci, PhD** Professor
TEMPLE UNIVERSITY	**Ellen Unterwald, PhD** Professor
UNIVERSITY OF CALIFORNIA BERKELEY	**Dan Feldman, PhD** Professor of Neurobiology **Candace Groskreutz** Neuroscience Graduate Program Manager
UNIVERSITY OF CALIFORNIA, DAVIS	**W. Martin Usrey, PhD** Professor
UNIVERSITY OF CALIFORNIA, SAN DIEGO	**Brad Voytek, PhD** Assistant Professor

	Ege Yalcinbas Graduate Student **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 **Deanne Sylvester** Neuroscience Program Administrator
UNIVERSITY OF IOWA	**C. Andrew Frank, PhD** Assistant Professor **Jessica Thomas, BS** Graduate Student
UNIVERSITY OF MARYLAND	**Jessica A. Mong, PhD** Associate Professor Department of Pharmacology Director of Graduate Education, Program in Neuroscience **Georgia Rogers** Academic Services Specialist
UNIVERSITY OF MICHIGAN	**Audrey Seasholtz, PhD** Professor, Biological Chemistry **Edward Stuenkel, PhD** Professor, Molecular & Integrative Physiology Director, Neuroscience Graduate Program **Veronica Varela** Graduate Student
UNIVERSITY OF PENNSYLVANIA	**Kelly L. Jordan-Sciutto, PhD** Professor of Pathology
UNIVERSITY OF SOUTHERN CALIFORNIA	**Pat Levitt, PhD** Provost Professor and Director USC Neuroscience Graduate Program
UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER SAN ANTONIO	**David Morilak, PhD** Professor of Pharmacology
UNIVERSITY OF UTAH	**Bryan Jones, PhD** Research Associate Professor
UNIVERSITY OF WASHINGTON	**Jane Sullivan, PhD** Associate Professor, Physiology and Biophysics
VANDERBILT UNIVERSITY	**Danny G. Winder, PhD** Professor, Molecular Physiology and Biophysics; Psychiatry **Douglas G. McMahon, PhD** Stevenson Professor of Biological Sciences
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 of Neurosurgery and of Neuroscience

T32 RECRUITMENT FAIR PARTICIPANTS

Brown University

Program Representative(s): Gilad Barnea, PhD; Anne C. Hart, PhD; David Sheinberg, PhD
http://neuroscience.brown.edu/graduate/

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. 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.

Georgetown University

Program Representative(s): Edith Brignoni-Pérez; Ludise Malkova, PhD; G. William Rebeck, PhD
https://neuroscience.georgetown.edu/

The Interdisciplinary Program in Neurosciences (IPN) at Georgetown University is the largest biomedical PhD granting program at Georgetown University. This broad-based, transdisciplinary, non-departmental program leads to a PhD 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 has 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): Rosalind A. Segal, MD, PhD
http://dms.hms.harvard.edu/neuroscience/

The goals of the interdepartmental PhD Program in neurosciences at Harvard University 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.

Icahn School of Medicine at Mount Sinai

Program Representative(s): George W. Huntley, PhD
http://icahn.mssm.edu/education/phd/neuroscience

Mount Sinai's Neuroscience Training Program offers year 1 and year 2 predoctoral students an exciting curriculum taught by a nationally and internationally recognized faculty, and a laboratory experience that builds on expertise in translational neuroscience, basic neurobiology, psychiatry and neurology, all uniquely 'interfaced' with one another due to close apposition of clinical and basic neuroscience research at Mount Sinai Hospital and the Icahn School of Medicine at Mount Sinai. At the heart of the Neuroscience Training Program are Mount Sinai's Neuroscience PhD, the school's second PhD granting program, and a superb training faculty who share a common thematic interest: study of the function and plasticity of specific neural circuits, during development, in the adult, and in the aged, diseased or degenerating nervous system. Varied laboratory opportunities at Mount Sinai take advantage of strengths in translational neuroscience, notably in developmental neurobiology, neural aging and degeneration, mechanisms of neuropsychiatric disease, cognitive neuroscience, computational neuroscience and neuroimaging, sensory signal transduction, neuroendocrinology and synaptic and behavioral plasticity. The nervous system is studied in diverse model systems, from 'simple' invertebrates such as the sea snail Aplysia, the fruit fly, or the worm C. elegans, all the way to complex vertebrates including nonhuman primates and humans. Students will receive a strong foundation in basic neuroscience and the neurobiology of disease, in a collaborative environment that actively promotes multidisciplinary, integrative research. Using this interdisciplinary approach, the Neuroscience Training Program will provide students with the essential knowledge and experimental tools to initiate productive, independent careers in the laboratories of our training faculty.

Johns Hopkins University School of Medicine

Program Representative(s): Anna Chang; Solange Brown, MD, PhD; Jay Baraban, MD, PhD
http://neuroscience.jhu.edu/

The Neuroscience Training Program (NTP) at Johns Hopkins University was established in 1983 to provide students with advanced instruction and research training in the neurosciences. It now includes 92 training faculty in 21 different departments across the university, as well as several associated institutes (National Institute of Drug Abuse, Mind-Brain Institute, Brain Science Institute) where neuroscience research is performed. In addition, the NTP has a joint graduate program with the Howard Hughes Medical Institute, and students have the opportunity to perform thesis research at the Janelia Research Campus of HHMI. The program encompasses a broad array of research areas, including molecular, cellular, developmental, sensory, systems, cognitive, and computational neuroscience, as well as neurobiology of disease, providing diverse training options and unique opportunities for collaboration for our students. We typically matriculate 10-12 PhD candidates each year, from a pool of ~350 applicants, and 1-4 additional candidates for combined MD/PhD degrees (who are admitted through a separate process). Students enter the program with diverse backgrounds ranging from computer science to biochemistry. To ensure that they learn the basic tenets of neuroscience, they are required to take a year-long integrative lecture and laboratory course, "Neuroscience and Cognition," as well as statistics and a perspective/orientation course, "Science, Ethics, and Society." Students learn about research opportunities through a mini-symposium series led by Program Faculty (featuring short chalk talks), the Department Retreat, and Lab Lunches (which feature work-in progress by NTP faculty). This information is used to help students arrange three 12-week laboratory rotations, which are typically completed by the end of the first academic year, and form the basis for selecting a thesis advisor. By the end of the second year, students have completed five elective courses, from 20 small seminar-style courses in different neuroscience specialties or relevant courses offered in other departments. At the end of Year 2, students write and defend a Thesis Proposal that is written in the form of a Predoctoral NRSA application. Each student in mentored by two Pre-thesis Advisors in Years 1-2 (at 3 month intervals) and an individualized Thesis Advisory Committee thereafter (at 6-12 month intervals). Thesis Advisory Committees report student progress to the Graduate Program Steering Committee, which carefully tracks the advancement of each student in the program and establishes overall program policy. At present, 75 students are enrolled in the NTP. The average time to complete the PhD for the past ten years is 5.7 years. Of the students who have graduated from our program, 92% are pursuing careers in science or medicine. Students who are interested in careers outside academia (pharmaceutical industry, data science, science policy) are provided opportunities to gain additional exposure and training appropriate for these disciplines.

Michigan State University

Program Representative(s): Cheryl Sisk, PhD
https://neuroscience.natsci.msu.edu/

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 and Chiye Aoki, PhD
http://www.neuroscience.nyu.edu/

This integrated, multidisciplinary, neuroscience training program at New York University, prepares trainees for the intensely collaborative and innovative nature of modern neuroscience research. Over the last decade, 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. Our program, which includes 104 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 recent success 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 foster a diverse and collaborative scientific culture through the recruitment of high caliber students, 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. 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.

Oregon Health and Sciences University

Program Representative(s): Gary L. Westbrook, MD
http://www.ohsu.edu/xd/education/schools/school-of-medicine/academic-programs/neuroscience-graduate-program/

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; Jonathan Cohen, PhD; Ken Norman, PhD
https://pni.princeton.edu/

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; Anthony Ricci, PhD
https://neuroscience.stanford.edu/

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): Ellen Unterwald, PhD
http://www.temple.edu/neuroscience/

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 and Candace Groskreutz
http://neuroscience.berkeley.edu/

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. 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): W. Martin Usrey, PhD
https://neuroscience.ucdavis.edu/

The goal of the Training Program in Basic Neuroscience 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 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): Bradley Voytek, PhD; Ege Yalcinbas
https://healthsciences.ucsd.edu/education/neurograd/Pages/default.aspx

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; Deanne Sylvester
http://www.ucdenver.edu/academics/colleges/medicalschool/programs/Neuroscience/Pages/Neuroscience.aspx

The Neuroscience Training Program (NSP) at the University of Colorado, School of Medicine is an interdisciplinary PhD granting degree started in 1986 that has been funded by a Jointly Sponsored Training Grant since 2001. The NSP has 60 faculty members. 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 and Jessica Thomas, BS
https://neuroscience.grad.uiowa.edu/

The Neuroscience Graduate Training Program focuses on integrated, broad-based, fundamental, multidisciplinary predoctoral training in Neuroscience at the University of Iowa. The program builds on more than three decades of success in matriculating and training top-caliber students, on stable, mature leadership, and on a steady increase over the past ten years in the quality and depth of our applicant pool. The program is modest in size (48 current students) and 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), extensive training in statistics and experimental design, and specific training in rigor, transparency, and reproducibility in science. 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 School of Medicine

Program Representative(s): Georgia Rogers; Jessica Mong, PhD
http://lifesciences.umaryland.edu/Neuroscience/

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; Veronica Varela
http://neuroscience.med.umich.edu/

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 74 faculty representing 24 departments in 4 schools or colleges. The wide academic distribution, strong research funding and high-level of peer recognition of the ESTN faculty excellently matches our focus on broad early stage training in neuroscience. In the first year, students complete a broad-based neuroscience curriculum that includes: neuroscience "boot camp", 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, 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
https://www.med.upenn.edu/ngg/

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
https://ngp.usc.edu/

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): David Morilak, PhD
http://uthscsa.edu/neuroscience/

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): Bryan Jones, PhD
http://neuroscience.med.utah.edu/

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
http://depts.washington.edu/neurogrd/

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): Douglas G. McMahon, PhD; Danny G. Winder, PhD
https://as.vanderbilt.edu/neuroscience/

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
http://neuroscience.graduate.wfu.edu/

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
http://neuroscience.wustl.edu/

Washington University in St. Louis has a long tradition of excellence in the neurosciences. Here, Erlanger first measured nerve conduction velocity and its relation to axon diameter. In the 1950s, Levi-Montalcini, Cohen and Hamburger discovered the first neuronal trophic factor, nerve growth factor. Today, a large and interactive faculty focuses interest on almost every area of modern neuroscience ranging from molecular analysis of ion channels to positron emission tomography of the human brain.
Over 150 faculty from the departments of Neuroscience, Anesthesiology, Biochemistry and Molecular Biophysics, Biology, Biomedical Engineering, Cell Biology and Physiology, Developmental Biology, Genetics, Molecular Microbiology, Neurology, Neurosurgery, Ophthalmology and Visual Sciences, Pathology and Immunology, Physics, Psychiatry, Psychological & Brain Sciences, and Radiology serve as advisers for thesis research and serve as teaching faculty in the neurosciences. Training pathways with federal support including the genetics of psychiatric diseases, modern methods in systems neural science, translating discoveries from bench to bedside and back, imaging sciences, and biotechnology entrepreneurship provide additional, specialized training within the Neuroscience Program. The remarkable breadth of faculty interests in neuroscience at Washington University guarantees a student's exposure to a wide range of current neurobiological problems and approaches.

Yale University

Program Representative(s): Michael Crair, PhD and Charles Greer, PhD
http://medicine.yale.edu/inp/

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

"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/

Mentoring Compacts:
Example compacts for download are available at https://ictr.wisc.edu/mentoring/mentoring-compactscontracts-examples/

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 PhD 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 PhD 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/ehavior 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
Isaac del Rio – Research Education Facilitator, New Mexico State University

ENDURE TRAINEE ABSTRACT

DEVIN EFFINGER

Home Institution and State: **University of Colorado Denver, CO**
Email: **devin.effinger@ucdenver.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology, Spring 2018**
Mentors/Advisors at Home Institution: **Sondra Bland, PhD**

ENDURE Trainee Scientific Interest:

My scientific interests involve investigating the effects of early childhood adversity and prenatal insults on brain development. Specifically, I am fascinated in the neurobiological alterations and the epigenetic modifications that occur after these early life insults and how they lead to the development of neuropsychiatric illnesses.

ENDURE Trainee Career Goals and Plan:

My career goals are to further expand the repertoire of knowledge concerning the neurobiology of substance use disorder. In doing so, I plan to develop new and more effective treatments that incorporate scientific research findings into new behavioral and pharmacological therapies that help to reduce relapse. I also plan to direct attention towards prevention by applying research findings to help reverse and prevent epigenetic modifications that occur from early traumatic experiences, preventing the formation of negative psychological belief systems and destructive behavior patterns.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Clare Paterson, PhD**

ENDURE Research Project Title: **Investigating the Effect of Neonatal IGF1 Treatment on Brain Development in a Rat Model of Preeclampsia**

Preeclampsia (PE) is the most common complication of pregnancy, affecting 3-5% of pregnancies worldwide. Pregnancies complicated by PE account for 12% of maternal deaths and 25% of fetal and neonatal deaths globally. PE pregnancies are associated with an overexpression of soluble fms-like tyrosine kinase-1 (sFLT-1) and under-expression of insulin-like growth factor-1 (IGF1). sFLT-1 prevents the proangiogenic factor VEGF from binding to its receptor leading to dysfunctions in vasculature and brain development in the developing fetus. However, therapeutic options for PE pregnancies and its associated brain dysfunction are unavailable. Therefore, in a rat model of PE utilizing gestational intra-amniotic injections of sFLT-1, we studied the histological effects of sFLT-1 up-regulation on brain development and determined if any histological abnormalities were reversed by early postnatal IGF1 treatment as a potential novel therapeutic target. To explore the neurodevelopmental impact of sFLT-1 up-regulation, histological analysis using Nissl stain was performed on PND14 rat brains including measures of ventricle volume, corpus callosum volume, motor cortex thickness, and overall brain volume. sFLT-1 upregulation induced significant abnormalities in corpus callosum volume, corpus callosum thickness, ventricle volume and overall brain volume without affecting motor cortex thickness. The IGF1 treatment proved to be ineffective in counteracting these observed morphological abnormalities. Together, these findings suggest that up-regulation of sFLT-1 has detrimental effects on brain development and that IGF1 treatment is an ineffective method of treatment.

ENDURE TRAINEE ABSTRACT

KELCIE GERRY

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

ENDURE Trainee Scientific Interest:

The mechanisms underlying the complex processes of how the brain interacts with the body captivates my attention. Specifically, the process of tissue regeneration and how the body is able to heal post injury and or clinical disease. My interdisciplinary training in Kinesiology and Medical Anthropology permit me to view research and the applications of it in a holistic manner. In particular, I am interested in areas of neuroscience research that examine natural products within the environment and tailor those to promote healing and treatment of neurodegenerative diseases.

ENDURE Trainee Career Goals and Plan:

Upon completion of my undergraduate degree, I aspire to enroll in an interdisciplinary neuroscience PhD program focused on sensory and behavioral neuroscience. Collaborating and actively pursuing advances in neuroscience research will allow me to achieve my goals of impacting human lives around the world. The dissemination and application of neuroscience research to maintain optimal human function in various stages throughout life drives me to continuously seek out community outreach opportunities where I can utilize my teaching skills and connect to the community.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Linda Barlow, PhD, and Dany Gaillard, PhD**

ENDURE Research Project Title**: Effect of fractionated irradiation on Wnt-catenin signaling in mouse circumvallate taste papilla.**

Taste is essential for proper nutrition and remains relatively constant throughout life via continual taste bud cell turnover. However, head and neck cancer patients, who receive small doses of radiation daily (fractionated) for ~7 weeks, experience extreme taste dysfunction during and following radiotherapy. We have shown in mice: (1) Wnt-catenin signaling is a major positive regulator of taste cell homeostasis, and (2) head and neck irradiation reduces taste cell turnover. Therefore, our goal was to determine if fractionated head and neck irradiation affects Wnt signaling in mouse taste tissue. To address this question, we irradiated the head and neck of mice with 4 Gy/ day for 5 days, and used qRT-PCR to assess expression of Wnt signaling genes TCF7, LEF1, NLK, and Bcl9 in the circumvallate taste papilla. TCF7 and LEF1 levels were reduced on Day 5 (the last day of fractionated irradiation), albeit not significantly, while NLK and Bcl9 expression was unchanged. However, expression of all 4 genes was significantly reduced compared to controls at 3 days post-irradiation. Therefore, our data suggest activating the Wnt pathway at- or shortly after the end of radiotherapy may mitigate taste loss upon irradiation by alleviating disruption of taste cell homeostasis.

ENDURE TRAINEE ABSTRACT

AMBER JOHNSON

Home Institution and State: **University of Colorado Denver, CO**
Email: **amber.n.johnson@ucdenver.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology, 2018**
Mentors/Advisors at Home Institution: **Carly Leonard, PhD, and David Albeck, PhD**

ENDURE Trainee Scientific Interest:

My favorite topics of study are Alzheimer's Disease, memory, and the sensory system. I would like to research ways to detect AD earlier by studying the sensory system response to certain stimuli that would normally induce a response. I am interested in alternative methods to improve and retrieve lost memories by activating parts of the sensory system associated with specific memories.

ENDURE Trainee Career Goals and Plan:

I will be graduating for the University of Colorado Denver spring 2018 with a BS in psychology and a minor in biology. I aim to be enrolled in a graduate neuroscience program to obtain my PhD in behavioral neuroscience. During graduate school I will study the neurobiology of sensory pathways and the transmission between the hippocampus and olfactory bulb. After graduate school I hope to be an established lead researcher at one of the nation's aging and brain institutes.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Diego Restrepo, PhD**

ENDURE Research Project Title**: Delayed associative learning in a transgenic Neuregulin 1 (NRG1-IV) mouse, an animal model of schizophrenia.**

Neuregulin IV (NRG-IV) is an isoform of the protein Neuregulin 1 (NRG1), a growth factor critical for neural development. High levels of NRG-IV were found in the hippocampus and prefrontal cortex of schizophrenic patients. This finding led to the hypothesis that impaired schizophrenic (SZ) individuals could be developmentally influenced by a mutated NRG1 gene made to express NRG-IV (Chong, 2008). The summer project in Restrepo's lab was to explore how overexpression of human NRG-IV impacted associative learning and memory in transgenic mice. We used transgenic mice generated by our collaborator Dr. Amanda Law overexpressing NRG-IV (+/+) compared to mice not expressing NRG-IV (-/+) (Papaleo et al, 2016). Thirsty mice learned discriminate between two odorants administered by an olfactometer, in a go-no go task that used water as positive reinforcement. Average percent correct data was analyzed to compare learning efficiency, and intertrial interval times were analyzed to determine how long it took each mouse to complete a trial. Both groups of mice were able to learn the task, but the NRG-IV mice took longer to complete the task. This suggests NRG-IV could play role in attention, distraction, and rate of learning, all which are cognitive symptoms of SZ. Further research is being performed to examine more in-depth the relationship between NRG-IV and cognition.

ENDURE TRAINEE ABSTRACT

MIKAELA NEAL

Home Institution and State: **University of Colorado-Colorado Springs, CO**
Email: **mneal@uccs.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biomedical Sciences, December 2018**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I am primarily interested in the neurodevelopmental alterations that stressful events in childhood can induce, and how these variations lead to both psychological and physiological symptoms in adulthood. Repeated exposure to stress in childhood causes a variety of modifications in the brain, however I am most interested in alterations to white matter. White matter abnormalities are seen in several neuropsychiatric disorders, such as bipolar disorder and schizophrenia. I am the most interested in how stress impacts long-range connections in the brain and how network alterations lead to specific symptoms in these disorders.

ENDURE Trainee Career Goals and Plan:

I hope to pursue an MD/PhD dual degree following my undergraduate career. Because medicine and research are so deeply intertwined in developmental neuroscience, I believe that bringing both degrees together to study neuroscience and treat neurological disorders is the ideal way for me to pursue my passions.

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: **Wendy B. Macklin, PhD, and Dylan Verden**

ENDURE Research Project Title: **Developmental Regulation of Glutathione in Myelinating Oligodendrocytes**

Oligodendrocytes are the cells of the central nervous system (CNS) that wrap axons with myelin, which allows for the fast transduction of electrical signals. Oligodendrocytes produce myelin in a short period during development (in the juvenile, or adolescent, developmental stage of the organism) and then enter a myelin maintenance stage once myelination is complete. The process of myelination generates reactive oxygen species (ROS) byproducts; however the mechanism by which myelinating oligodendrocytes mitigate oxidative stress is unknown. Because we have previously seen resilience to oxidative stress in juvenile oligodendrocytes, we are investigating the differences in antioxidant activity, specifically glutathione (GSH) metabolism, between juvenile and adult oligodendrocytes. GSH is a common antioxidant across many cell types that has been thought to be expressed at a low level in oligodendrocytes, but it may be required during the increased metabolism of active myelination. Comparison of gene expression in oligodendrocytes acutely isolated from juvenile or adult striatum by qPCR revealed increased levels of GSH-regulating genes in juvenile oligodendrocytes, relative to adult cells. Furthermore, immunohistochemical (IHC) analysis of juvenile and adult striatum revealed increased expression of glutathione-synthesizing proteins in juvenile oligodendrocytes. These results indicate that juvenile oligodendrocytes utilize the antioxidant GSH pathway during the process of active myelination.

ENDURE TRAINEE ABSTRACT

CAILEE NELSON

Home Institution and State: **New Mexico State University, NM**
Email: **cnelson7@nmsu.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology and Business Management, May 2018**
Mentors/Advisors at Home Institution: **Jim Kroger, PhD**

ENDURE Trainee Scientific Interest:

My scientific interests include understanding the underlying mechanisms of motivation and attention. Specifically, in training situations, I would like to understand what motivates different generations and groups of people to remain attentive and learn. Further, I would like to understand how certain learning deficits affect motivation and potentially discover ways to assist the learning process for people affected by those deficits.

ENDURE Trainee Career Goals and Plan:

My overall career goals are to earn a PhD in cognitive neuroscience and become a leader and influential force of the industry. I hope to work for companies to develop technologies and methods that improve the overall usability of their products as well as enhance the consumers' experience and lifestyle. Specifically, I would like to develop products that help people in learning environments.

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: **Cathy Bodine, PhD, and Levin Sliker, PhD**

ENDURE Research Project Title: **3D Printing of EEG Cap for Socially Assistive Robot Development**

Play is vital to a child's development. Through this development, it is important to take advantage of the plasticity of the brain to advance physical, cognitive, and social skills. However, children with disabilities are not always as able to benefit from that time. Socially Assistive Robots (SARs) provide a portable way for children with disabilities to increase the frequency of therapeutic intervention, allowing them to take advantage of the plasticity of their brain in a fun way. While there have been many positive outcomes for use of SARs with children with autism, slim research has been done on the use of SARs with children with severe motor disabilities. To understand this interaction better, our research focuses on investigating what kind of, if any, activity is occurring in the brain when a child is faced with a motor task. To do so, we 3D printed an EEG cap to record brain activity while participants are completing the motor task. Future directions point to therapists using an EEG system to capture what type of motor intervention tasks specific patients need and programming SARs to help carry out the therapeutic intervention at home.

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) PhDs trained in neurosciences: specifically, to facilitate their entry into high quality and highly competitive mainland PhD 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 PhD 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 years 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 PhD 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 PhD 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
Melissa Jaiman-Cruz – 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

SHANTEE AYALA ROSARIO

Home Institution and State: **InterAmerican University of Puerto Rico, PR**
Email: **s.ayala.1997@gmail.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Biotechnology, May 2020**
Mentors/Advisors at Home Institution: **Timothy Hendricks, PhD**

ENDURE Trainee Scientific Interest:

I am highly interested in the molecular endpoints that contribute to different diseases and abnormal behaviors. Especially health defects that are highly found in our society. Additionally, my love for chemistry makes my interest in studying the diverse toxic effects chemicals/drugs cause in biological processes in the nervous system spark. Therefore, I aim to learn about the captivating field of neurosciences in a multifaceted form.

ENDURE Trainee Career Goals and Plan:

I began my undergraduate studies desiring a Bachelor's degree in industrial chemistry; however, as I gained knowledge in the fascinating field of neuroscience, I realized biotechnology was my true passion. In order to pursue this passion, I am searching for opportunities in which I can grow as a professional through theory and practice; currently I am inclined on obtaining both a Doctor of Medicine (MD) and Doctor of Philosophy (PhD) degree, yet opt to be open-minded through those professional years. I long to be a well-rounded scientist with great potential in a wide range of disciplines.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Vedrana Bali, MD, PhD, and Michelle Mazei-Robison, PhD**

ENDURE Research Project Title: **Investigation of Inflammatory Responses in the Ventral Tegmental Area in Mouse Models of Depression**

Major Depressive Disorder is a debilitating chronic disease and a worldwide cause of disability, thus scientists are searching for the molecular and biological causes in order to improve treatment. Dysfunction of the brain reward system, and particularly changes in activity of dopamine neurons in the ventral tegmental area (VTA), may play a critical role in mood disorders. Furthermore, brain inflammation has been implicated as a contributing factor in the development of depression. The aim of this study is to characterize the inflammatory status of the VTA in two well-established mouse models of depression, physical and emotional chronic social defeat stress. Immunohistochemistry will be used to determine activation of microglia and astrocytes, by analyzing ionized calcium-binding adapter molecule 1 (Iba1) and glial fibrillary acidic protein (GFAP) signal, respectively, as well as changes in cellular morphology. Changes in inflammatory signaling in other reward-related brain regions, such as nucleus accumbens and hippocampus, will also be analyzed as positive controls, given reports of increased inflammation in these regions. This study seeks to identify if chronic stress alters inflammation status of the VTA, a key region of the reward circuit, improving our understanding of fundamental cellular and circuit changes involved in disease development.

ENDURE TRAINEE ABSTRACT

YOLIMAR COLON-LOPEZ

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

ENDURE Trainee Scientific Interest:

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**: William D. Atchison, PhD**

ENDURE Research Project Title: **Effects of acute MeHg-induced calcium changes in the Renshaw region of the C57BL6J mouse**

Methylmercury (MeHg) is an environmental neurotoxicant that affects the central nervous system (CNS). Previous studies have demonstrated that MeHg targets lumbar spinal cord motor neurons. In many cell types, a key MeHg neurotoxicity marker is dysregulation of intracellular calcium (Ca^{2+})i homeostasis. Spinal cord alpha motor neurons (αMN) send excitatory signaling onto Renshaw interneurons, which in turn send further inhibitory neurotransmission back to the same αMNs, ultimately modulating their signaling. The effects of MeHg during lumbar ventral spinal recurrent inhibition have never been studied. The aim of this project is to determine the effects of acute MeHg-mediated Ca^{2+} dysregulation during the excitatory and inhibitory signaling of recurrent inhibition between motor and Renshaw cells. Lumbar sections of the spinal cord of adult C57BL6J mice were exposed to 20 μM MeHg during 15 min through a real-time perfusion system. Ca^{2+} changes were recorded using Fluo4 at 0, 5, 10 and 15 min during MeHg exposure. The role of the acetylcholine (ACh), glycine and GABAA receptors in the motor and Renshaw cells was determined using a pharmacology approach. ACh receptor antagonists: Mecamylamine (MEC), Dihydro-ß-erythroidine hydrobromide (DHBE) and glycine and GABAA receptors antagonists: Strychnine and Bicuculline (BCC), were used before and during MeHg exposure. It is hypothesized that MeHg toxicity produces a differential

disruption of Ca^{2+} homeostasis in both cells types that mediate recurrent inhibition. Results show that MeHg treatment alone significantly increases $[Ca^{2+}]i$ at 15 min and 1 hr. Presence of all antagonists during MeHg treatment significantly decreases ventral $[Ca^{2+}]i$. Determining the role of MeHg-induced disruption in Ca^{2+} homeostasis through these receptors could further elucidate the mechanisms of MeHg-mediated neurotoxicity in recurrent inhibition.

ENDURE TRAINEE ABSTRACT

ROMINA GONZALEZ

Home Institution and State: **University of Puerto Rico-Cayey, PR**
Email: **gonza737@msu.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology, December 2019**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

My research interest is in the fields of neuropharmacology and neurotoxicology. I am interested in studying the effects of potential neurotoxicants ubiquitously found in the environment, such as methylmercury (MeHg). MeHg accumulates through the aquatic food chain and it targets the central nervous system (CNS) causing pernicious effects. To date, MeHg is still a concern for human health. Neurodegenerative diseases, such as Amyotrophic Lateral Sclerosis (ALS), are thought to be triggered by MeHg-induced neurotoxicity on motor neurons (MNs). Therefore, understanding the cell specificity of MeHg and its mechanism could contribute to elucidate the etiology on the vast of these diseases.

ENDURE Trainee Career Goals and Plan:

My short-term goal is to graduate with a bachelor in natural sciences majoring in biology and to complete a minor in psychology. In 2018, I expect to obtain an APA approved certification in neurobiological aspects of anxiety and depression, from the Carlos Albizu University. This fall, I am a student at Michigan State University in the Neuroscience Program. This experience will help me to further develop the field of neuroscience through the neuroscience chapter at my hometown university, the University of Puerto Rico at Cayey. After graduating, I will pursue a PhD in Neuroscience and later on postdoctoral fellowship.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Bill Atchison, PhD**

ENDURE Research Project Title**: Role of inhibitory and excitatory receptors in mediating calcium changes during an acute MeHg exposure on the C57BL6J mouse**

Methylmercury (MeHg) is a current neurotoxicant ubiquitously found in the environment, that affects human health. It accumulates through the aquatic food chain and it targets the central nervous system (CNS) causing pernicious effects. Literature reports that MeHg exposure triggers the dysregulation of intracellular calcium (Ca^{2+}) in many cells. Lumbar motor neurons (MNs) and Renshaw cells work in a feedback mechanism, in which MeHg-mediated Ca^{2+} dysregulation may produce hyperexcitability, ultimately leading to disruption of the negative feedback. The presence of cysteine residues on Aminobutyric acid (GABAA), glycine (Gly) and nicotinic acetylcholine (nACh) receptors may facilitate MeHg to target these neurons, leading to synaptic dysfunction. We want to elucidate the role of GABAA, Gly and nAChR receptors during MeHg-mediated $[Ca^{2+}]i$ dysregulation, using Fluo4 and a pharmacology approach. Data of acute 20μM MeHg exposure to the Renshaw area was collected in the absence and presence of the antagonists: strychnine, bicuculline, mecamylamine and DHE. MeHg treatment alone significantly increases $[Ca^{2+}]i$ at 15min and 1hr from baseline. Mecamylamine treatment in the presence of MeHg significantly decreases single-cell $[Ca^{2+}]i$ on the ventral lumbar region of the spinal cord. This research is important because it may elucidate mechanisms involved in dysregulation of recurrent inhibition during MeHg toxicity.

ENDURE TRAINEE ABSTRACT

KARINA MATOS

Home Institution and State: **University of Puerto Rico-Ponce, PR**
Email: **karina.matos@upr.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology and Mental Health, 2019**
Mentors/Advisors at Home Institution: **James T. Porter, PhD at Ponce Health Sciences University, PR**

ENDURE Trainee Scientific Interest:

I have a special interest in studying the relationship between gastrointestinal and psychiatric disorders. More specifically, the communication between gastrointestinal bacteria and the nervous system.

ENDURE Trainee Career Goals and Plan:

My goal is to achieve a PhD in neuroscience. After graduation I want to attend Michigan State University, the University of California or the University of Michigan, who are doing some promising research on gastrointestinal disorders. After a PhD I want to pursue a post-doctorate, and later became a professor.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Yihang Li, PhD; Mrigendra Rajput, DVM; and Adam Moeser, DVM (advisor)**

ENDURE Research Project Title: **Early Life Stress Alters the Development and Neural Regulation of Nutrient Transport in Porcine Small Intestine**

The enteric nervous system controls nutrient absorption via regulation of the activity of the nutrient transporters, which could play a pathophysiologic role in disease pathogenesis associated with early life stress. In the present study, we sought to elucidate how early-life stress affects the neuronal regulation of nutrient transporter function in the small intestine. We hypothesized that early life stress will induce chronic impairment of glucose and amino acid transport that is mediated via the enteric nervous system. 16 littermate, matched female piglets were randomly assigned to early weaning stress (15 d of age), of late weaning (29 d of age). All pigs were raised under the same protocol until 70 d of age, when small intestine samples were collected to evaluate the electrogenic nutrient transport activity using the Ussing Chambers technique. By analyzing the individual nutrient-induced increase in tissue short circuit current (delta Isc), we found a significant suppression ($p < 0.05$) of glucose, alanine and glutamate transport, but a significant enhancement ($p < 0.05$) of lysine transport in EW pigs compared with LW control pigs. Together, these data suggest that early psychological stress in a porcine model of EW stress has long lasting effects on nutrient transport in porcine small intestine, which may be regulated by alterations in cholinergic nervous system activity.

ENDURE TRAINEE ABSTRACT

JARIEL RAMIREZ

Home Institution and State: **University of Puerto Rico-Cayey, PR**
Email: **jariel.ramirez@upr.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology, 2019**
Mentors/Advisors at Home Institution: **Yan Levitsky; Julia Busik, PhD; and Denis Proshlyakov, PhD**

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: **Amrita Oak and Christina Chan, PhD**

ENDURE Research Project Title: **Relevance of Inositol-Requiring Enzyme 1 under ER Stress in Cellular Respiration**

In mammalian cells, inositol-requiring enzyme 1 (IRE1) is a protein in the endoplasmic reticulum (ER) membrane that has been shown to play a crucial role in cellular survival and apoptosis. IRE1 can be activated upon ER stress, and ER stress has been implicated in numerous diseases, including cancer. Palmitate (PA) is a saturated fatty acid known to induce ER stress, by promoting dimerization and activation of IRE1; ultimately leading to either a survival or apoptotic response. Recently the Chan laboratory found that PA interacted directly with IRE1 to activate X-box binding protein 1 (XBP1) and its downstream signaling. XBP1 is known to impact cellular metabolism. We expect that the cell-respiration, determined by the extracellular acidification rates (ECAR) and oxygen consumption rates (OCR), will provide insight into the role of IRE1 in metabolism mediated by PA. Methods: With the use of Seahorse XF24, the OCR and ECAR were measured in a 24 well plate. Wild-type (WT) and IRE1 knock-out (KO) MEF cells will be evaluated under normal conditions and PA treatment and further inhibition of Carnitine Palmitoyltransferase 1 through etomoxir. Results: We expect to find similar OCR and ECAR between the WT and IRE1 KO cells treated with BSA but a slight increase in both rates in PA treated cells. Nonetheless, the IRE1 KO cells will maintain its original respiration rate while the WT cells will show a higher OCR and ECAR. Conclusions: This study on cell-respiration will provide some understanding of PA role in metabolism that is mediated by IRE1 and could have implications on the treatment of ER-stress associated diseases.

ENDURE TRAINEE ABSTRACT

YAMILKA RIOS

Home Institution and State: **University of Puerto Rico-Humacao, PR**
Email: **yamilka.rios@upr.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Biology, 2018**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

The areas I have most interest in to continue my academic career are: cognitive and behavioral neuroscience, neurobiological link with behavioral mental diseases, epidemiology and toxicology.

ENDURE Trainee Career Goals and Plan:

My goals for when I finish my undergraduate studies include getting a PhD in biomedical sciences, and later work as a professor and researcher in a university.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Greg Swain, PhD and Serban Peteu, PhD**

ENDURE Research Project Title: **The Electrochemical Detection of Peroxynitrite Using Chemically Modified Diamond Electrodes**

Peroxynitrite (PON, ONOO-) is a major oxidative agent with cytotoxic effects. It is generated from the reaction of nitric oxide (NO) and superoxide radical (O2-). This molecule is related to a wide range of physiological and pathological processes and is a known mediator in inflammatory diseases. Many techniques have been developed for the detection of PON including fluorescence probing, nitrotyrosine detection and electrochemical sensors. Since PON is very difficult to detect in vivo due to its sub-second lifetime and high reactiveness at physiological pH, electrochemical sensors offer advantages for the selective real-time detection and quantification of PON. Such sensors could potentially be integrated into breath analyzers and used to detect and quantify PON in exhaled breath condensate. PON is a useful biomarker of respiratory diseases, particularly those that involve oxidative or nitrosative stress. In this investigation, chemically-modified diamond electrodes were fabricated and used to detect PON. The electrodes were modified with hemin and hemin + polyethylenedioxythiophene (PEDOT) films electro-polymerized onto the electrode surface. PON was generated from 3-Morpholino-sydnonimine (SIN-1) and detected in phosphate-buffered saline (PBS) solution at pH 7.4. Hemin was used as a catalytic agent for the oxidation of PON, while EDOT created a synergy with hemin and improved its entrapment on the electrode. The electrochemical response of the sensors to PON was studied using cyclic voltammetry and continuous amperometry. From these tests, detection figures of merit including response time, linear dynamic range, sensitivity, detection limit and stability were determined. The presentation will review these findings.

ENDURE TRAINEE ABSTRACT

NICOLE RIVERA

Home Institution and State: **Pontifical Catholic University of Puerto Rico, PR**
Email: **rivera52@msu.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology, 2019**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

My research interest is on how environmental neurotoxicants affect the central nervous system possibly leading to neurodegenerative diseases. I had the opportunity to research under the Pharmacology and Toxicology Department of Michigan State University in which under the guidance of Dr. Atchison, I was able to see the effect that the environmental neurotoxicant methylmercury had in the N- and L-type calcium channels of cerebellar astrocytes, and discovered that both calcium channels were equally significant in the mechanisms of MeHg-induced toxicity. I want to combine psychology, neuroscience and toxicology to understand how different neurotoxicants affect both the body and human behavior.

ENDURE Trainee Career Goals and Plan:

My long term goal is to obtain my PhD and become a neuropsychologist. A neuropsychologist's main concern is on how the brain and the rest of the nervous system influence a person's behavior and cognition. As a psychologist, I will be able to bring about my research into treating the patient and helping them surpass their body's downfall making sure that they are able to integrate back into society and that their social interactions are not affected by any mental disorder, such as depression or anxiety, that may arise.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Bill Atchison, PhD**

ENDURE Research Project Title: **Cytotoxicity through the L-type and the N-type Voltage-Gated Calcium Channels after an Acute Exposure of Methylmercury on Primary Cerebellar Astrocytes**

Methylmercury (MeHg) is a potent pollutant that affects the nervous system. This toxicant produces an increase in the influx of internal Ca^{2+} through the Ca^{2+} channels. The aim of this project was to study the effect of MeHg in the Ca^{2+} channels, and its relationship with cerebellar astrocytes cytotoxicity. Determining the relationship between MeHg-induced influx of Ca^{2+} with cell death could help us understand the mechanisms of MeHg toxicity in cerebellar astrocytes. 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 21h after the 3h of MeHg exposure using ethidium homodimer and calcein-AM. To determine if the voltage-gated calcium channels were affected by MeHg, the inhibitor nimodipine, dissolved in methanol at 10 μM was used for the L-type channel and the inhibitor ω-conotoxin GVIA dissolved in water at 1 μM, was used for the N-type channel. Nimodipine was pre-incubated for 15 minutes and ω-conotoxin GVIA for 7 minutes. Both were co-incubated with MeHg for 3 hours and placed in the media for 21 hours. The results showed that both voltage-gated calcium channels were equally significant in the mechanisms of MeHg induced toxicity.

ENDURE TRAINEE ABSTRACT

KIMBERLY RIVERA-CARABALLO

Home Institution and State: **University of Puerto Rico-Humacao, PR**
Email: **kimberly.rivera8@upr.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Microbiology, May 2019**
Mentors/Advisors at Home Institution: **Edwin Traverso, PhD**

ENDURE Trainee Scientific Interest:

As a microbiologist with previous research experiences, I started seeing science with different eyes: as wide-ranging, integrative and diverse, therefore, integrating many disciplines for career building is essential. Looking forward for a PhD in toxicology, I realized that studying environmental factors that affect living things is a perfect way to apply microbiology and toxicology knowledge to understand diseases. Conducting research in different areas made me well aware of the wide window of opportunities available for me.

ENDURE Trainee Career Goals and Plan:

I have participated on undergraduate research on my hometown institution and two summer research opportunities. Motivated to expose myself to the science workforce, I have come out of my comfort zone to achieve my goals and taken advantage of experiences such as undergraduate conferences and workshops that allow me to grow professionally and given me a better perspective of professional careers. Learning about my field of interest through interactions with underrepresented minorities as peers, serve as motivation to continue pursuing a career in science. In this manner, my active participation has helped me grow self-confidence and given me the support of believing that I have the ability to excel.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Duanghathai Wiwatratana, MS and William Atchison, PhD**

ENDURE Research Project Title: **The Expression of Excitatory Amino Acid Transporter 1 and 2 mRNA During Methylmercury Exposure in Spinal Cord Astrocytes**

Excitotoxicity and oxidative stress are involved in methylmercury (MeHg)-induced neuronal death. Astrocytes play a critical role in neuronal protection from excitotoxicity by elimination of extracellular glutamate from the synapses through the excitatory amino acid transporter 1 and 2 (EAAT1 and EAAT2). Mercury and reactive oxygen species (ROS) reportedly inhibit EAAT1 and EAAT2 re-uptake of extracellular glutamate. MeHg also induces ROS generation in cortical and cerebellar astrocytes. In the spinal cord, where motor neuron degeneration occurs, the role of spinal cord astrocytes in MeHg- toxicity has not been fully characterized. We hypothesized that MeHg could induce the down-regulation of EAAT1 and EAAT2 mRNA expression in spinal cord astrocytes. Subsequently, excitotoxicity and, eventually, neuronal death occur. In this study, spinal cord astrocyte cell cultures were exposed to 0.5uM MeHg for 30 min, 1 h and 3h. The expression level of EAAT1and EAAT2 mRNAs were determined using quantitative polymerase chain reaction. At 30 min, EAAT1 and EAAT2 mRNA levels were not altered. During 1h and 3h exposure, the EAAT2 mRNA levels were slight affected. The EAAT1 mRNA levels appeared to increase about 2.4 fold at 1h exposure then greatly decline its expression to 0.5 fold at 3h. The increase and later decrease of EAAT1 mRNA levels suggests astrocytes earlier attempt to buffer the glutamate-mediate excitotoxicity and the subsequent reduction of EAAT1 expression could exacerbate excitotoxicity occurring during MeHg-toxicity.

ENDURE TRAINEE ABSTRACT

SHAKIRA RODRIGUEZ-GONZALEZ

Home Institution and State: **University of Puerto Rico-Cayey, PR**
Email: **shakira.rodriguez5@upr.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Natural Science- Spring 2019**
Mentors/Advisors at Home Institution: **Ricardo Chiesa, PhD**

ENDURE Trainee Scientific Interest:

My experience with the ENDURE program at Michigan State University helped me to confirm my research and career interests. I will pursue a research career in the neuroscience field. Specifically, I will like to study neurodegenerative diseases as ALS and Alzheimer's. I will like to focus on the mechanism of how they develop.

ENDURE Trainee Career Goals and Plan:

Before graduation, I will like to attend to another summer internship related to neuroscience. After graduation, I want to pursue a MD/PhD in Neuroscience. Also, I am considering to apply to a post-bac program to increase my research skills before applying to the MD/PhD program.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Brian Gulbransen, PhD**

ENDURE Research Project Title: **Role of the gut microbiome on the ontogenesis of the enteric nervous system**

The enteric nervous system (ENS) is a complex network of neurons and glial cells organized in two plexuses within the walls of the intestine. It functions to coordinate gastrointestinal reflexes that control motility, secretion and absorption. The development of the ENS occurs within a constantly changing environment that culminates in the establishment of the gut microbiome after birth. The gut microbiome contributes to both the development of the ENS and the physiology of the gut, but how altering the microbiome affects the development of the ENS is not clear. We hypothesize that depleting the microbiome by exposure to antibiotics during prenatal and postnatal development impairs the maturation of the ENS. We will test our hypothesis by assessing the effects of antibiotics on the activity and anatomy of the ENS in mice expressing the genetically encoded calcium indicator GCaMP5g and the fluorescent reporter tdTomato in glia (Sox10CreERT2 mice). Pregnant females will receive an antibiotic cocktail in drinking water after breeding and throughout pregnancy and control females normal drinking water. Samples of the colon and ileum will be harvested from pups at postnatal days 1, 7 and 14 to assess the spontaneous activity glial cells using GCaMP5g fluorescence. We will analyze the architecture of the ENS by imaging tdTomato fluorescence of glia.

ENDURE TRAINEE ABSTRACT

SIMON SANCHEZ

Home Institution and State: **St. Mary's University, TX**
Email: **swolfsanchez@outlook.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Biophysics, May 2019**
Mentors/Advisors at Home Institution: **Richard Cardenas, PhD**

ENDURE Trainee Scientific Interest:

I am interested in studying all aspects of the brain and nervous system and to gain a deeper understanding of the function of nerve cells.

ENDURE Trainee Career Goals and Plan:

I hope to graduate with a PhD in neuroscience and continue to further my interest in research.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Qiang Wang, PhD, Ke Dong, PhD and William Atchison, PhD**

ENDURE Research Project Title: **Evaluation of Repellent Activities of Essential Oils Camphor, Norcamphor, and Thujone in Two Drosophila Species**

Essential oils derived from various plants have been shown to repel insects including flies and mosquitoes. Camphor and thujone are two essential oils that found, respectively, in the wood of the camphor laurel, a large evergreen tree found in Asia, and in several plants, such as the arborvitae, cypress, and wormwood. Norcamphor is an analog of camphor, but without the three methyl groups. The objective of this study was to test the potential repellency of camphor, norcamphor and thujone against two species of the fruit fly, *Drosophila melanogaster* and *Drosophila suzukii*. *D. melanogaster* is a model insect and *D. suzukii* is an invasive pest known for its tendency to attack healthy, ripening fruit leading to crop loss and threatening fruit production. Electrophysiological recording experiments show that camphor, norcamphor and thujone activate specific olfactory neurons in both insect species. Preliminary T-maze behavioral assays showed that these compounds exhibit repellency against adult flies. Findings from this study suggest that camphor, norcamphor and thujone are potent repellents that may be further evaluated to be incorporated as a strategy for *D. suzukii* control.

ENDURE TRAINEE ABSTRACT

LEEZA SANTIAGO MILLAN

Home Institution and State: **University of Puerto Rico in Humacao, PR**
Email: **leeza.santiago@upr.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology 2018**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

My interest primarily lies in translational science. Since I do not have a lot of exposure to a diverse array of biomedical research approaches, I am open to new experiences. I must mention that I enjoyed and found very interesting the topics covered in my past research experiences. In general, the research involved developmental biology, genetics, and molecular mechanisms involving metabolic and neurodegenerative diseases. I feel confident working in projects under these areas, but I am not afraid to step out of my comfort zone.

ENDURE Trainee Career Goals and Plan:

I want to pursue an MD/PhD because I aim to better lifestyles through translational or clinical research. After spending my summer at the NIH, gaining my first experience in biomedical researching, I learned the superlative ability of being able to collaborate successfully with others and a passion for health-related research. The experience reassured me of what I wanted to achieve for my future as a physician scientist. Overall, I plan to expose myself to opportunities that will help me make wiser decisions towards my academic path to fulfill my goals of becoming a physician scientist.

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: **Cindy Jordan, PhD, Marc Breedlove, PhD, and Katherine Halievski, PhD**

ENDURE Research Project Title: **Expression of Neurotrophic Factor Genes in Motor Neurons of Mouse Models of Spinal Bulbar Muscular Atrophy**

Neurotrophic factors (NTFs) are essential for the survival and upkeep of healthy neuromuscular systems, and their expression is often perturbed in neuromuscular diseases like spinal bulbar muscular atrophy (SBMA). SBMA arises from an abnormal expansion of a CAG/glutamine encoding repeat in the androgen receptor (AR) gene. Because both motor neurons (MNs) and skeletal muscles express ARs, both may be key drivers in SBMA pathogenesis. Skeletal muscles express different NTFs, many of which are perturbed in MN disease, including BDNF, GDNF, IGF-1, NGF, and CNTF. We now ask whether expression of NTFs are comparably perturbed in the spinal cord and if so, whether such defects are triggered by mutant ARs acting in motor neurons or skeletal muscle. To answer this question, we used RT-qPCR to examine the mRNA expression of NTFs in the spinal cord of diseased male mice from three transgenic mouse models: 97Q (global expression of mutant AR), and motor neuron-specific and skeletal muscle-specific expanded AR models developed using cre/lox technology. Determining which NTFs are perturbed, and whether mutant AR in MNs and/or skeletal muscle triggers such defects, will help delineate further studies testing NTFs as therapeutic agents for SBMA.

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
Rochelle Smith – Program Manager, Washington University

ENDURE TRAINEE ABSTRACT

JOSEPH BRADLEY

Home Institution and State: **Harris-Stowe State University, MO**
Email: **joe.bradley53@yahoo.com**
Undergraduate Academic Level: **Graduated**
Undergraduate Major and Expected Graduation Date: **Biology, May 2016**
Mentors/Advisors at Home Institution: **Tommie Turner, PhD**

ENDURE Trainee Scientific Interest:

My research interests involve mechanisms involved in neurodegeneration and genetic variants that drive these mechanisms.

ENDURE Trainee Career Goals and Plan:

My career goal is to be a physician scientist working in genomics and genetics to help treat people with neurodegenerative diseases and dementia.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Yuetiva Robles, PhD, and Carlos Cruchaga, PhD**

ENDURE Research Project Title: **Identification of Blood eQTLs for AD Risk Loci**

Using microarray blood RNA expression data from ADNI along with genome wide association study data from the same individuals, this project uses multivariate linear regression to identify blood eQTLs for the genes located under the GWAS loci for AD risk. These analyses can help to identify the functional SNPs driving the original association as well as the functional gene. Our analyses show significantly associated variants for expression in ABCA7, three isoforms of BIN1, CR1, HYDIN, INPP5D, MEF2C, two isoforms of MS4A6A, two isoforms and PTK2B, two isoforms of SLC24A4, and ZNF3. The eQTLs for ABCA7, BIN1, MS4A6A, PTK2, SLC24A4 and ZNF3 have been previously reported eQTLs for the same regions in at least on other tissue. The other eQTLs in this analysis are novel. Now we are analyzing whether these SNPs are also associated with AD risk, onset, disease duration or biomarker level such as Cerebrospinal fluid tau or AB levels. Ultimately, these analyses will help to identify the functional variant and gene driving the GWAS signal as well as to identify novel and independent signals in those areas.

ENDURE TRAINEE ABSTRACT

ALEXANDER CONWAY

Home Institution and State: **Saint Louis University, MO**
Email: **alexpconway@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Neuroscience, May 2018**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I am interested in molecular neuroscience, particularly in elucidating gut-to-brain signaling.

ENDURE Trainee Career Goals and Plan:

I plan to pursue a PhD in a biomedical science upon graduation and subsequently use my scientific training for a career outside of academia.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Zecai Liang; Sara Prescott, PhD; and Stephen Liberles, PhD**

ENDURE Research Project Title: **Localization and function of vagal GPCRs involved in gut-brain signaling**

Receiving, conveying, and responding to sensory information from internal organs in the body is vital to proper autonomic function. Serving as a major conduit between the brain and the viscera, the vagus nerve controls the basic physiological functions of the respiratory, cardiovascular, immune, and digestive systems. The molecular and cellular diversity of murine vagal sensory neurons was previously investigated in order to disentangle the neural control of autonomic physiology (Williams et al., 2016). Among the identified vagal subtypes, distinct populations expressing the G-protein coupled receptors (GCPRs) Gpr65, Glp1r, and Cckar were found to innervate the gastrointestinal (GI) tract and have been implicated in regulating GI function, but the precise localization and role of these receptors during gut-to-brain signaling is not fully understood. In order to further elucidate the role of each GPCR in gut-brain signaling, the present study seeks to investigate the localization of these GPCRs by creating and delivering GFP-fusion proteins within explanted vagal sensory neurons to visualize localization by GFP immunofluorescence. Concurrently, the present study also seeks to further identify ligands for orphan receptor Gpr65 using a cell-based GPCR functionality assay.

ENDURE TRAINEE ABSTRACT

YA'EL COURTNEY

Home Institution and State: **Kent State University, OH**
Email: **ycourtne@kent.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Cellular and Molecular Biology, 2019**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

This summer I focused on fMRI research and heredity research as they relate to the possible use of neural activation as an endophenotype for heritable mental disorders. In the future, I am interested in any work that works to uncover the mechanisms by which mental disorders cause abnormality, and the interpretation of these mechanisms into treatment opportunities.

ENDURE Trainee Career Goals and Plan:

After receiving my Bachelor's degree in cellular and molecular biology, I intend to pursue my PhD in neuroscience. After this, I will complete a post-doc and then begin my own research. My driving goal is to ease the suffering of individuals and families of individuals affected by debilitating mental disorders. I intend to use my biological and biochemical training to parse out the mechanisms behind some disorders that currently remain poorly understood.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution**: Joset Etzel, PhD; Todd Braver, PhD, Erik Herzog, PhD; and Diana Jose-Edwards, PhD**

ENDURE Research Project Title: **The Influence of Genetics on Individual Differences in Neural Activation Patterns in the Visual and FrontoParietal Communities**

Individual differences in brain function arise from genetic and environmental influences and play an important role in understanding variation in executive control, cognitive ability, and personality. By collecting task fMRI and behavioral data for monozygotic (MZ) twins, dizygotic (DZ) twins, siblings (SIB), and unrelated people, the Human Connectome Project (HCP) allows investigation of the degree to which genetics shapes these differences. This study compared activation similarity patterns in the frontoparietal and visual networks across these subject groups. Activation similarity was correlated for the N-back task under conditions of high or low working memory load and across two object stimulus categories. If heritability plays a substantial role in determining neural activation, groups of higher genetic similarity should have more similar activation patterns. Indeed, in both networks considered, MZ twins showed a higher similarity than DZ twins or siblings, and DZ twins and siblings showed a higher similarity than unrelated participants. Furthermore, this correlation is emphasized under conditions of higher cognitive load in the frontoparietal network. This provides evidence that genetic influences play a substantial role in the neural basis of individual differences, and ultimately helps lay the foundation for task-related brain activation to be considered as an endophenotype for psychiatric or neural disorders.

ENDURE TRAINEE ABSTRACT

OLIVIA GAUTIER

Home Institution and State: **Massachusetts Institute of Technology, MA**
Email: **ogautier@mit.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biological Engineering and Brain and Cognitive Sciences, 2018**
Mentors/Advisors at Home Institution: **Troy Littleton, MD, PhD**

ENDURE Trainee Scientific Interest:

Broadly, I am interested and cellular and molecular neuroscience. Somewhat more specifically, I am interested in studying the molecular mechanisms of neurological diseases.

ENDURE Trainee Career Goals and Plan:

I plan to start attending graduate school in 2018. My current plan is to stay in academia after attending graduate school.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Karen O'Malley, PhD**

ENDURE Research Project Title**: mGluR5 is functional at the cell surface and at intracellular membranes in cortical astrocytes**

The metabotropic glutamate receptor 5 (mGluR5) is a G protein-coupled receptor (GPCR) and potential therapeutic target for several disorders including Fragile X syndrome, autism, and schizophrenia. Unlike most GPCRs, mGluR5 mediates signaling effects from both the cell surface and intracellular membranes in neurons. Because this receptor is also expressed in astrocytes in the brain, it is important to determine whether mGluR5 localizes to the cell surface and intracellular membranes in astrocytes and to study the effects of astroglial mGluR5 modulation in these different locations. To address these questions, we used primary cortical astrocytes expressing endogenous receptors together with pharmacological targeting of cell membrane and intracellular mGluR5. Measurements of downstream responses showed that mGluR5 is functional on the cell surface and intracellular membranes in cortical astrocytes. Additionally, we found that activation of either cell surface or intracellular mGluR5 leads to ERK1/2 activation, whereas activation of intracellular mGluR5 alone leads to RPS6 activation. These results highlight the importance of studying mGluR5 in both a location-dependent and cell type-dependent manner so that effective therapeutics can be made in the future.

ENDURE TRAINEE ABSTRACT

MARIA GONZALEZ

Home Institution and State: **University of Puerto Rico-Cayey, PR**
Email: **maria.gonzalez66@upr.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Natural Sciences, 2019**
Mentors/Advisors at Home Institution: **Maria I. De Jesus, PhD**

ENDURE Trainee Scientific Interest:

From my point of view, research is the expression of curiosity, the path our brain takes to discover unknown things and the way we can address the most challenging questions that demand being answered. Currently, I feel interested in various topics that go from the molecular mechanisms driving development to the diseases that can arise from errors through our growth. Among these, I am especially interested in our nervous system, since it controls almost every process that maintains an equilibrium in our body and, therefore, has a huge impact on our health.

ENDURE Trainee Career Goals and Plan:

Being aware of my interest in human health and how it can be improved through research, my academic goal is to first, obtain my Bachelor's degree in natural sciences and then, start my graduate education as an MD/PhD. As a scientist, I want to be able to take discoveries and translate them to improve health. As a doctor, I want to identify the most challenging clinical problems that need to be addressed in a laboratory. As an MD/PhD, my career goal is to contribute to the efforts of breaking the barriers of medicine and science until they become one.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Joshua Rubin, MD, PhD, and Erik Herzog, PhD**

ENDURE Research Project Title**: TAp63 overexpression mitigates sexually dimorphic proliferation in mesenchymal glioblastoma astrocytes**

The incidence rate of glioblastoma is higher in males than females regardless of age, race or environment. The mesenchymal glioblastoma subtype shows the greatest difference with a ratio of 1.6:1 males to females. In a mouse model of mesGBM, characterized by the loss of the tumor suppressors Neurofibromin 1 and p53, our lab has previously shown that male mesGBM astrocytes display greater proliferation rates, clonogenic frequency and tumorigenesis in vivo. RNA sequencing of male and female mesGBM astrocytes revealed a higher expression of the p53 family member, TAp63, in females. Higher TAp63 expression has been found to correlate with a better prognosis in GBM. To test the sufficiency of TAp63 to mediate sex differences in GBM, we developed a Dox inducible system for overexpressing TAp63 in male and female mesGBM astrocytes. Here we show that when the alpha isoform of TAp63 is overexpressed in mesGBM astrocytes cell proliferation is decreased in males. These results suggest that differential expression of TAp63 could contribute to the sex differences in proliferation observed in our model. We anticipate that a better understanding of the role of TAp63 in sex differences in GBM will lead to the identification of important pathways as potential therapeutic targets.

ENDURE TRAINEE ABSTRACT

MARISSA HANSEN

Home Institution and State: **University of Texas at Austin**
Email: **marissa.m.hansen@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Neuroscience, May 2018**
Mentors/Advisors at Home Institution: **Guadalupe Gonzalez and David Schnyer, PhD**

ENDURE Trainee Scientific Interest:

I am most interested in researching topics within the fields of molecular neuropharmacology and synaptic neuroscience. My primary research focus is dissecting the molecular mechanisms of opioid receptors and understanding GPCR modulation of dopaminergic reward pathways in drug addiction. I am also interested in further decoding and understanding the proteins in the supramolecular complexes involved in synaptic vesicular release.

ENDURE Trainee Career Goals and Plan:

I plan to attend graduate school in 2019 in order to pursue a PhD in neuroscience. I have yet to determine my long-term career goals but am actively trying to expose myself to a variety of neuroscience fields and learn techniques employed in different research areas.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Skylar Spangler and Michael Bruchas, PhD**

ENDURE Research Project Title**: Investigating Biased Arrestin-3 Recruitment to Nociceptin/Orphanin FQ Opioid Receptor (NOPR)**

The recently discovered opioid receptor, the nociceptin/orphanin FQ opioid receptor (NOPR), has therapeutic potential for treating drug addiction as demonstrated by the FDA-approved drug Buprenorphine, a NOPR partial agonist, and recent behavioral studies that show NOPR agonism blocks reward seeking behavior in rodents across multiple drug classes. Despite this, little is known about the signaling dynamics by which NOPR exerts these effects. My training lab has determined that the endogenous ligand nociceptin induces recruitment of arrestin-3, a scaffolding protein which mediates GPCR desensitization and internalization through NOPR c-terminal tail phosphorylation. I propose that NOPR c-terminal tail phosphorylation encodes arrestin functionality, as the specific phosphorylation patterns that recruit arrestin-3 remain unknown. I explored the biased signaling of NOPR in arrestin-3 recruitment using a variety of NOPR phospho-mutants and biased ligands SCH 221,510 and MCOPPB to dissect the molecular mechanisms of NOPR-arrestin recruitment. I used Bioluminescence resonance energy transfer (BRET) assays to quantify real-time binding between NOPR and arrestin in order to construct concentration response curves as a means of identifying signaling bias. This study shows that arrestin-3 recruitment is not dependent on phosphorylation of c-terminal tail sites as indicated by NOPR-arrestin interaction with the NOPR c-terminal phospho-null mutant.

ENDURE TRAINEE ABSTRACT

FABRIA JNO. BAPTISTE

Home Institution and State: **University of Maryland, Baltimore County, MD**
Email: **fabriaj1@umbc.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Chemical Engineering, May 2019**
Mentors/Advisors at Home Institution: **Jennie Leach, PhD**

ENDURE Trainee Scientific Interest:

I am interested in research pertaining to neurological disorders, stroke, and the rehabilitation of neurological injuries as a result of central nervous system damage.

ENDURE Trainee Career Goals and Plan:

Upon completion of my undergraduate degree program I plan to pursue an MD/PhD in biomedical engineering with my research primarily focusing on the creation of new method and techniques for brain rehabilitation for those that have suffered from neurological trauma and injuries.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Jeanne Nerbonne, PhD; Eric Johnson, PhD; and Erik Herzog, PhD**

ENDURE Research Project Title**: Expression, Localization and Functional Roles of Accessory Protein Subunits in Modulating Cardiovascular Voltage-Gated K+ Ion Channels**

The heart is comprised of electrically excitable muscle cells known as myocytes that participate in the contraction of the heart as it beats. These electrically excitable cells communicate via cardiac action potentials, where voltage-gated potassium (Kv) channels play an essential role in repolarizing the action potential which works to maintain normal cardiac function. Kv channels are composed of pore-forming subunits and a wide-variety of accessory subunits that modulate the current. These experiments will focus on the effects of subunits on modulating Kv channel behaviour. The absence or mutation of subunits are linked to multiple forms arrhythmia that can lead to sudden cardiac death. The use of qPCR will uncover which subunits are highly expressed in the mouse heart. Through immunohistochemistry, the localization of these expressed subunits will be tracked. Once the localization and expression level of the subunits are determined, patch clamp electrophysiology will be utilized to investigate functional roles of these accessory subunits through recording the biophysical properties of the ion channels depolarization in mouse myocytes. Using a patch clamp rig with whole-cell configuration, voltage-clamp experiments will be conducted to determine how 1 and 4 affect Kv channels through making comparisons between the wildtype and knockout. The yields of voltage-clamp and current-clamp recordings should reveal that the knockdown of subunits reduces the current densities in the isolated myocytes while the action potential waveforms are prolonged. The results of these experiments show that there is a significant decrease in the current density following the knockdown of the subunits in Kv channels suggesting that these subunits are in fact key to maintaining normal cardiac function.

ENDURE TRAINEE ABSTRACT

CHELSEA MACKEY

Home Institution and State: **University of Missouri, MO**
Email: **cmackey11112@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology and Psychology, May 2018**
Mentors/Advisors at Home Institution: **Mahesh Thakkar, PhD, and Rishi Sharma, PhD**

ENDURE Trainee Scientific Interest:

I hope to address three main topics in my career: neurological disorders, cognitive and behavioral neuroscience, and biochemical and molecular neuroscience.

ENDURE Trainee Career Goals and Plan:

I plan to utilize my academic training in biology and psychology to increase my marketability in the fields of cognitive and behavioral studies as well as continuing my long-term goal with biology as an anchor for a PhD in neuroscience.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Erik Musiek, MD, PhD, and Geraldine Kress, PhD**

ENDURE Research Project Title**: A Characterization of Amyloid Pathology and Circadian System Function in APP-NLGF Mice**

Disruption of circadian rhythms has been observed in Alzheimer's Disease (AD) patients and circadian system dysregulation has been suggested as a possible mechanism of disease pathogenesis. One of the neuropathological hallmarks of AD is the presence of amyloid plaques, which are thought to be pathogenic. In order to study the relationship between the circadian system and AD pathogenesis, we examined if APP NLGF mice, a relatively new AD transgenic mouse model displays any circadian deficits, either at the cellular or behavior level. First, we determined if there are plaques within the master circadian pacemaker -the SCN, located in the ventral hypothalamus. The SCN synchronizing cellular clocks throughout the body, including neuronal and glial clocks peripheral to the SCN. If there are changes in the circadian system, then the SCN could potentially be the locus of this dysfunction and perhaps may be riddled with plaques. At the cellular level, we quantified a core circadian molecular clock component, PER2 as a proxy for SCN circadian function. At the behavior level, we assayed the locomotor wheel-running behavior rhythm which is known to be under circadian control. We concluded that the accumulation of Aβ plaque within the master pacemaker, the SCN, does not correlate with the abundance of a core circadian clock component, PER2, but may correlate with a change in the period of circadian locomotor rhythm. Our results demonstrate that AD may correlate with a circadian behavior abnormality. Our future directions will aim to examine if there are changes in the oscillation of core clock components within the SCN and the hippocampus of varying aged APP-NLGF mice.

ENDURE TRAINEE ABSTRACT

MAKENZIE NORRIS

Home Institution and State: **Purdue University, Indiana**
Email: **norris35@purdue.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Neurobiology and Physiology, May 2018**
Mentors/Advisors at Home Institution: **Susan Sangha, PhD**

ENDURE Trainee Scientific Interest:

I am very interested in the mechanism of addiction in the brain as well as other anxiety related conditions.

ENDURE Trainee Career Goals and Plan:

I would like to attend graduate school with the intent of earning a PhD in neuroscience. My career goals include working in industry on drug addiction related projects.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Erik Herzog, PhD; Diana Jose-Edwards, PhD; Jordan McCall, PhD; and Ream Al-Hasani, PhD**

ENDURE Research Project Title: **Potential role for central amygdala dynorphin neurons in affective behaviors**

The central amygdala plays a major role in motivated behaviors such as food and drug seeking as well as stress and pain processing. Chronic activation or dysregulation of the CeA and its associated circuitry can promote both pain and drug abuse, however little is known about how different cell-types and receptors systems within the CeA control these behaviors. Recent studies have sought to better understand opioid receptor systems in the brain with the intent on developing less addictive analgesic medications. The kappa opioid receptor system (KOR) has shown promise both as a less addictive analgesic as well as the potential to help prevent relapse in opioid addiction. The study of the endogenous neuropeptide ligand for the KOR system, dynorphin, may lead to a better understanding of where KOR activity occurs in the brain. To address these shortcomings, this project seeks to understand the role of central amygdala dynorphin neurons in generating these behaviors in mice models. To test this system directly, we used in vivo optogenetics to photostimulate dynorphinergic neurons in the central amygdala while running a real-time place behavior experiment to test for aversive behaviors. In a separate set of experiments, we sought to determine whether central amygdala dynorphin neurons are selectively activated by painful or appetitive stimuli. We found that photostimulation of dynorphinergic neurons in the central amygdala produced real-time aversive behaviors within a specific frequency range. Our immunohistochemical studies are still underway, but indicate there may be distinct central amygdala dynorphin neuron activity when behaviorally manipulated by pain than by exposure to appetitive stimuli. These findings provide preliminary data for further investigation of central amygdala dynorphin neurons and their affects as they pertain to opioid analgesia and addiction.

ENDURE TRAINEE ABSTRACT

DERRICK OGOLA

Home Institution and State: **Washington University in St. Louis, Missouri**
Email: **d.k.ogola@wustl.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Neuroscience, May 2019**
Mentors/Advisors at Home Institution: **John Cirrito, PhD, and Carla Yuede, PhD**

ENDURE Trainee Scientific Interest:

I am interested in the molecular mechanisms that underlie neurodegenerative disease, particularly Alzheimer's disease. Understanding the fundamental processes involved in disease provides the greatest opportunity for therapeutic intervention, and I plan to work in the interface of basic and translational neuroscience finding novel solutions for biomedical application.

ENDURE Trainee Career Goals and Plan:

I have become enchanted with the possibilities present at the junction of basic science research and patient care, and I plan to pursue MD/PhD training in neuroscience. I hope to work as an independent investigator and a physician.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **John Cirrito, PhD, and Carla Yuede, PhD**

ENDURE Research Project Title: **Synaptic Dependent Amyloid-β 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-beta (Aβ) oligomers and plaques. 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. To determine whether changes in synaptic activity alter the amounts Aβ in the brain, we developed novel micro-immunoelectrode (MIE) technology that detects Aβ in the brain ISF with high temporal resolution in the hippocampus of living mice allowing us to examine rapid Aβ kinetics. We 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 excitatory and inhibitory drugs. Here, we show that changes in levels of Aβ are closely related synaptic activity in the brain, with large increases in synaptic activity rapidly elevating Aβ levels in the mouse brain, and inhibition of nonspontaneous synaptic activity decreasing Aβ levels in vivo in a concentration dependent fashion. 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, LA**
Email: **sgoneal34@hotmail.com**
Undergraduate Academic Level: **Graduated; Postbac**
Undergraduate Major and Expected Graduation Date: **Neuroscience, May 2017**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I am interested in the mechanisms behind motivated behavior and affective disorders, like depression and anxiety.

ENDURE Trainee Career Goals and Plan:

I currently am interested in obtaining an MD/PhD degree so that I may both practice as a neurologist, as well as study affective disorders in a lab setting.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution:

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title: **Anatomical study of the afferents to the dorsal and ventral nucleus accumbens shell**

Recent research has demonstrated that within the nucleus accumbens shell (NAcSh), an area important in affective behaviors and addiction, dynorphin (dyn) acting via kappa opioid receptors (KORs) drives two, opposing behaviors: reward via activation in the dorsal NAcSh (dNAcSh) and aversion via activation in the ventral NAcSh (vNAcSh). We, therefore, hypothesized that different brain regions project to either sub-region. To test this, we injected the retrograde virus, canine adenosine virus tagged with GFP, in V-GLUT and V-GAT Cre mice in both sub-regions. Three weeks post viral injection, we perfused, dissected, sectioned, and then Nissl stained the brains. We also utilized a clearing technique (CLARITY) to globally visualize projections. Using microscopy, we examined and characterized the afferents to both sub-regions. Overall, we observed a larger number of GABAergic afferents compared to glutamatergic afferents to the NAcSh. We also identified differences in both V-GAT and V-GLUT projections to both sub-regions. We observed a robust V-GAT projection from the preoptic area and dorsal tenia tecta to only the vNAcSh; and dense glutamatergic projection from the substantia nigra to the vNAcSh. These findings are critical in understanding the projections that drive the dyn mediated reward and aversion behaviors within the NAcSh.

ENDURE TRAINEE ABSTRACT

JULIA PAI

Home Institution and State: **New York University, NY**
Email: **julia.pai@nyu.edu**
Undergraduate Academic Level: **Graduated**
Undergraduate Major and Expected Graduation Date: **Neuroscience, May 2017**
Mentors/Advisors at Home Institution: **J. Anthony Movshon, PhD**

ENDURE Trainee Scientific Interest:

I'm interested in the neural circuits that guide voluntary behavior. Currently, I work on understanding the computations and microcircuitry that underlie early visual processing.

ENDURE Trainee Career Goals and Plan:

I plan on pursuing a PhD, after working for a few years in a systems lab where I can learn fundamental techniques and about theoretical frameworks for understanding the brain.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Ilya Monosov, PhD**

ENDURE Research Project Title: **Primate ventral pallidum neurons are sensitive to the timing of uncertainty-resolving information**

When humans and other animals are faced with situations where the chances of obtaining a future reward are uncertain, it is often necessary to monitor particular cues in the environment to prepare for and learn from what happens. In such cases, advance information about the probability of good or bad outcomes occurring allows animals to adjust their behavior accordingly. However, how uncertainty signals change in the brain as new information is introduced is not yet well understood. The ventral pallidum (VP) contains neurons sensitive to reward uncertainty, and is an area crucial for maintaining motivation and the hedonic impact of rewards. We show that neurons in VP modulated by uncertain reward probability are also highly sensitive to the timing of advance information about uncertain reward outcomes. Neural responses reflected whether uncertainty was resolved at the time of the trial outcome, or after the presentation of a visual cue that predicted the certainty of a future reward. Within the population of reward uncertainty-modulated neurons, positive or negative uncertainty modulation also correlated with reward value. These results suggest that the established role of VP in controlling motivation could be supported by neuronal encoding of value, uncertainty, and information timing in order to guide reward and information-seeking behavior.

ENDURE TRAINEE ABSTRACT

JORDAN PEYER

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

ENDURE Trainee Scientific Interest:

I am interested in researching psychopharmacological treatments for psychological and neurological disorders, the neurological formation of memory, and the relationship between neural activity and behavior.

ENDURE Trainee Career Goals and Plan:

I aim to earn an MD/PhD degree in neurochemistry and work as a medical scientist researching new treatments for neurodegenerative diseases and addiction.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Daniel Abernathy, PhD, Andrew Yoo, PhD, Diana Jose-Edwards, PhD, and Erik Herzog, PhD**

ENDURE Research Project Title: **MicroRNA-based reprogramming of human adult fibroblasts into dopaminergic neurons**

Parkinson's disease (PD) is characterized by the deterioration of dopaminergic (DA) neurons of the substantia nigra pars compacta. The ability to generate neurons directly from PD patients will offer powerful research tools to study the pathogenesis of PD intrinsic in patient-derived neurons. One promising source of patient specific DA neurons is those generated through direct neuronal conversion of patient fibroblasts. We have previously shown that ectopically expressing the brain-enriched microRNAs miR-9/9* and miR-124 (miR-9/9*-124) in human fibroblasts allows efficient generation of human neurons that retain the age of fibroblast donors, as measured by age-associated cellular properties such as DNA methylation patterns and telomere length; unlike DA neurons derived from induced pluripotent stem cells (iPSCs). We also have shown that coexpressing miR-9/9*-124 and a discrete set of transcription factors (TFs) leads to subtype-specific neuronal reprogramming of human adult fibroblasts. In this study, we screen TFs enriched in DA neurons with the aim of identifying genes capable of guiding the miR-9/9*-124-based conversion to DA neurons. Our results serve as the first step towards optimizing this method, which we aim to use as a source of neurons for in vitro PD modeling.

ENDURE TRAINEE ABSTRACT

MARCO PIPOLY

Home Institution and State: **University of Missouri St. Louis, MO**
Email: **mapf48@mail.umsl.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date:
Mentors/Advisors at Home Institution: **Carissa Philippi, PhD, and David Tate, PhD**

ENDURE Trainee Scientific Interest:

I am interested in the neurobiological mechanisms that contribute to decision making. The questions that I am most excited about revolve around how much genes and environment contribute to the phenotypes observed in decision making.

ENDURE Trainee Career Goals and Plan:

First, I aim to go to graduate school to earn a PhD in a neuroscience discipline. A career in academia as a researcher is the most appealing to me, and a main factor for the pursuit of a PhD. The programs I am considering stress integration and interdisciplinary training. In a field where methods like neuroimaging, genotyping, and optogenetics are becoming common practice, training in these techniques will be vital for longterm success.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Deanna Barch, PhD, and Erin Moran, PhD**

ENDURE Research Project Title: **Variations in Grey and White Matter Volume In Relation to Impulsivity in Healthy Adults**

Individuals with disorders that appear to involve impairments in impulsive choice, such as smoking and pathological gambling, have shown significant differences in volumetric brain measures compared to those without. These differences include larger caudate, nucleus accumbens, and putamen volumes, but reduced orbitofrontal cortex (OFC), and ventral lateral prefrontal cortex (vlPFC) gray matter (GM) and white matter volumes (WM). These differences are thought to contribute to dysfunction arising from over activity of striatal regions involved in responding to incentives coupled with the underperformance of brain systems involved in regulating behavior and inhibitory responses of the prefrontal cortex. However, findings on the relationships between individual differences in impulsivity and brain volumes in healthy adults have been mixed, potentially because most studies have had relatively small samples using various approaches. To address this, we examined data on 913 unrelated non-smoking healthy adults between the ages of 23 and 35 (M=29) from the Human Connectome Project (HCP) data set. The HCP is a large study that acquired data that included both behavioral and neuroimaging measures. To assess impulsive choice in the HCP, participants were given a delay discounting (DD) task in which they had to make choices between larger but later rewards or sooner but smaller rewards. Indifference points (point where people are equally likely to choose sooner or later rewards) from both a smaller amount ($200), and a larger amount ($40,000) were used to estimate an area under the curve (AUC) measure that indexed the degree of delay discounting (higher AUC, less discounting). We examined variation in impulsive choice performance using volumetric predictors. A General Linearized Mixed Model approach was used with GM and WM volumes in the regions of interest as predictors of AUC, controlling for age, gender, and intracranial volume. Only one

volume predictor proved to be significant after taking into account intracranial volume, which was the right nucleus accumbens ($p<.021$; $F=5.371$; $t=2.318$). The test revealed a strong positive relationship between AUC and right nucleus accumbens volume that went against our hypothesis that larger striatal volumes would be associated with greater impulsivity. Interestingly, intracranial volume (ICV) was also identified as a strong predictor of impulsivity, revealing a positive relationship with AUC ($p<.003$; $F=8.584$; $t=2.930$). This result was not predicted, though ICV is thought to potentially reflect early in utero or perinatal insults that can also be associated with impulse related disorders. Overall, our findings suggest that variation in impulsivity among healthy individuals is associated with variation in brain volume, but that the relationships do not necessarily mirror those found in clinical disorders involved in impulse controls. Future studies may seek to address the relationship of ICV and striatal volumes in both clinical and non-clinical aspects of impulsivity by looking at developmental changes in different brain structures during across the course of development to elucidate their role in impulsivity.

ENDURE TRAINEE ABSTRACT

TAYLOR REID

Home Institution and State: **Washington University in St. Louis, MO**
Email: **tjreid@wustl.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Computer Science and Cognitive Neuroscience, 2019**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I'm in interested in learning how neurobiological basis give rise to abnormal behaviors and diseases, that is, if neurotransmitters or brain structures are altered what is the impact on behaviors and diseases. I'm also interested in potential treatments at a neurobiological level to prevent abnormal behaviors and diseases.

ENDURE Trainee Career Goals and Plan:

I plan to go to graduate school for neuroscience and then go into academia.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution:

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title: **Assessing the Relationships between Blood Makers and Executive Memory Brain Regions in HIV+ Patients**

The portion of people living with HIV Associated Neurocognitive Disorder (HAND) has diminished due to HIV antiretroviral therapy but remains a concern even in virologically well-controlled individuals. In HAND, HIV Reservoirs become activated by the immune system and that causes inflammation in the brain. The inflammation atrophies the brain, which leads to cognitive impairments. It is unknown how measures of inflammation relate to anatomical and cognitive changes in well-controlled HIV+. There is a need for novel biomarkers to identify the cognitive impairment. Measures of inflammation are Neopterin, C-reactive protein, and sCD163. CD32a is a measure of HIV Reservoirs. The purpose of this study was to identify peripheral markers of inflammation and HIV reservoirs that correlate with cognitive function and anatomical changes. We hypothesized there would be negative correlation between inflammation blood markers and brain volumes, and there would a negative correlation between HIV Reservoir blood markers and brain volumes. Results revealed the putamen was negatively correlated with Neopterin. The cognitively impaired cohort had significantly smaller Dorsolateral Prefrontal Cortex and Insula compared to the non-impaired cohort. The Precentral was negatively correlated with CD32a in the non-impaired subjects. Finding these correlations with inflammation markers could help identify the HIV+ patients at risk of developing cognitive impairments.

ENDURE TRAINEE ABSTRACT

ASHLEY TAYLOR

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

ENDURE Trainee Scientific Interest:

I am very interested in neuroscience research with medical implications. My research interests especially pertain to axon regeneration, degenerative diseases, and traumatic spinal cord/brain injuries.

ENDURE Trainee Career Goals and Plan:

My current career goals are to be involved in research and medical practice. I am also interested in ways that I can impact the STEM and medical fields in general.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution:

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title: **Satellite glial cells may influence dorsal root ganglia response to axon injury**

Spinal cord injuries are a detrimental problem today with few options for therapy or hope for full recovery. The peripheral nervous system (PNS), unlike the adult central nervous system (CNS), is able to reactivate a regenerative response after axon injury. Therefore, if we can better understand the mechanisms that allow for the PNS to regenerate, we can apply this knowledge to understanding the CNS. The dorsal root ganglion (DRG), which resides in the PNS, is comprised of both regeneration-competent neurons as well as a variety of other cell types. While the mechanisms underlying regeneration in neurons is well-studied, how the surrounding neuronal environment affects the DRG's ability to regenerate is largely unknown. Therefore, we investigated the influence of the satellite glial cells (SGCs), a cell type that completely ensheath the cell body of DRG neurons, in axon regeneration. We first defined the structure of the DRG to provide an in vivo model. Furthermore, we found that co-culture of DRG neurons with SGCs was sufficient to increase regeneration compared to DRG neurons alone. We anticipate that understanding how SGCs contribute to the regenerative response will elucidate novel regulators of axon regeneration and may help to improve regeneration in the CNS.

ENDURE TRAINEE ABSTRACT

DAVID TYUS

Home Institution and State: **Washington University in St. Louis, MO**
Email: **davidtyus@wustl.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Biochemistry and Cognitive Neuroscience, 2019**
Mentors/Advisors at Home Institution: **Denise Head, PhD, Joan Strassmann, PhD, and Warren Davis, MA**

ENDURE Trainee Scientific Interest:

I am broadly interested in understanding the body on a small scale in order to better target medicine/therapy.

ENDURE Trainee Career Goals and Plan:

I wish to work as a research scientist and professor. My plan is to receive a PhD in biochemistry and work in an academic setting.

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: **Colin Nichols, PhD, and Conor McClenaghan, PhD**

ENDURE Research Project Title: **The Effect of KATP Channel Mutations on Inhibitor Sensitivity: Implications for Personalized Treatment of Cantu Syndrome**

KATP channels are heteromeric complexes composed of pore-forming Kir6.x and regulatory SURx subunits. Cantu Syndrome (CS) is a rare, complex disease characterized by a wide array of cardiovascular features caused by mutations in the genes encoding Kir 6.1 and SUR2 that result in the overactivity of the encoded ATP-sensitive potassium (KATP) channels. Currently, no cure exists for CS, but KATP inhibitors are promising candidates for the treatment of the disease; however, the effect of CS mutations on drug sensitivity have yet to be established. The goal of this project was to test several inhibitors of KATP channels against mutations found in CS patients (Kir 6.1[V65M] and Kir 6.1[C176S]) to investigate their potential clinical benefit. KATP activity in the presence or absence of inhibitors (glibenclamide, repaglinide [both SURx interacting], and terfenadine [Kir6.x interacting]) was determined by measuring the efflux of radioactive 86Rb+ from CosM6 cells transfected with wild type or mutated channels. The results show that each of the mutations resulted in decreased sensitivity to inhibitors of diverse structural classes which interact with different channel subunits. These findings demonstrate the requirement for comprehensive studies to investigate the effects of CS mutations on inhibitor sensitivity.

ENDURE TRAINEE ABSTRACT

SAMANI UPADHYAY

Home Institution and State: **Brown University, RI**
Email: **samani_upadhyay@brown.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Neuroscience, 2019**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I am interested in a wide variety of neuroscience research including neurodegenerative disease, neural regeneration, and neuroplasticity. I am fascinated my the large impacts micro neural circuitry changes can have on health and the entire body.

ENDURE Trainee Career Goals and Plan:

After college, I hope to pursue an MD/PhD to integrate my medical and research interests and conduct translational research across disciplines. I want to combine medical diagnosis with direct clinical research to better address treatments and therapeutics for disease.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution:

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title: **Plasma amyloid-beta isoform profile and its implication on early Alzheimer's diagnosis**

Alzheimer's disease is characterized an accumulation of amyloid plaques (amyloidosis) and tau fibrillary tangles due to an inability to clear amyloid beta peptides (abeta) from the brain. The current methods to test for amyloidosis - cerebral spinal fluid biomarkers and PiB-PET scans - are invasive and limited by time, labor, and cost. Due to this concern, blood plasma is an alternative biomarker to screen the general population for AD. Using pooled plasma from the blood bank, I profile abeta isoforms as potential biomarkers that may differ with AD status. Using immunoprecipitation, I isolate abeta from plasma and subsequently analyze the samples by bottom up and top down liquid chromatography and mass spectrometry methods. In addition to confirming the presence of three regular abeta isoforms measured in plasma, Abeta 38,40, and 42, I characterized unstudied isoforms. These additional isoforms will enable the accuracy of diagnosis and screening to be improved in plasma to enhance AD diagnosis in blood instead of CSF. My findings indicate that two novel isoforms, abeta 39 and abeta 37, exist in normal human control plasma. The methods, validations, and characteristics to confirm the presence of these isoforms in plasma will be presented.

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
Kizzy Vazquez - Program Administrator, Hunter College
Dr. Heather McKellar – Program Manager, New York University

ENDURE TRAINEE ABSTRACT

BRIGETT CARVAJAL

Home Institution and State: **Hunter College, NY**
Email: **bricarvajal@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology, June 2018**
Mentors/Advisors at Home Institution: **Peter Serrano, PhD**

ENDURE Trainee Scientific Interest:

My current research interests revolve around understanding the neural systems underlying complex behaviors such as memory, reward and their applicability to synaptic plasticity and development. Throughout my undergraduate research career, I have focused on investigating the role of sex hormones on neural processes. To further contribute to our understanding of the molecular mechanisms that underlie sex differences.

ENDURE Trainee Career Goals and Plan:

Ultimately, I intend to pursue an MD/Ph.D. with a research concentration in Neuroscience, following my undergraduate career. Pursuing a dual MD/PhD degree is an ideal way to approach translation research that will allow me to improve quality care for future generations by providing accessibility to cutting-edge research while serving to further enrich the scientific community.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Alexander Jaworski, PhD**

ENDURE Research Project Title: **Genetic Fate Mapping of Commissural Neurons in the Spinal Cord**

Spinal commissural neurons constitute a heterogeneous population of interneurons that arises from multiple progenitor domains in the embryonic neural tube. These neurons project their axons across the ventral midline of the spinal cord, make connections with either local or supraspinal targets, and play a crucial role in the circuits that integrate and relay somatosensory information from the peripheral nervous system. However, neither the precise developmental origins nor the mature neurotransmitter phenotypes and functions of commissural neurons have been fully described. Here, we characterize commissural neurons in the spinal cord to elucidate their origin from multiple embryonic progenitor domains and their mature molecular makeup. To accomplish this, we use mice expressing Cre recombinase from the Robo3 locus in combination with a Cre-dependent reporter line. Robo3 is an axon guidance receptor that is selectively expressed by all spinal commissural neurons and is required for axonal midline crossing. We combine genetic labeling of commissural neurons from Robo3Cre/+:ROSA26LSL-tdTomato/+ mice with immunofluorescent staining that labels various neuronal subtypes during early embryonic development. Our studies provide insights into the development of commissural neurons and serve as a starting point to elucidate their contribution to somatosensory information processing.

ENDURE TRAINEE ABSTRACT

RODRIGO DE LA TORRE

Home Institution and State: **New York University, NY**
Email: **rd1913@nyu.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Neuroscience, 2019**
Mentors/Advisors at Home Institution: **Marisa Carrasco, PhD, and Ian Donovan**

ENDURE Trainee Scientific Interest:

I am particularly interested in the neural processes of learning and to what extent this is affected by neurodegenerative diseases such as Alzheimer's and Multiple Sclerosis. I was attracted to neuroscience after taking AP Psychology in high school; I thoroughly enjoyed the latter, but felt compelled to understand the mechanics behind the brains functions in addition to its external manifestations.

ENDURE Trainee Career Goals and Plan:

Given that I thoroughly enjoy both the theoretical, and the practical aspects of scientific research, I hope to pursue my studies of the brain at a graduate level. Having researched PhD programs, I am drawn towards those which focus on cellular and molecular studies in neuroscience.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Lauren Moore; Henry Paulson MD, PhD; and Maria do Carmo Costa, PhD**

ENDURE Research Project Title: **Characterizing p62 Pathology in SCA3 Disease-Specific Human Embryonic Stem Cells**

Spinocerebellar ataxia type 3 (SCA3) is a progressive neurodegenerative disorder, and as one of nine polyglutamine (polyQ) diseases, it is caused by an abnormally long CAG trinucleotide repeat leading to a polyQ expansion in the disease protein. In SCA3 this expansion occurs within the deubiquitinating enzyme, ATXN3. SCA3 is characterized by neuropathological changes including accumulation of proteinaceous aggregates and nuclear localization of mutant ATXN3, leading to dysfunction and death of selective neuronal populations. Recent studies point to disrupted autophagy as a major contributor to SCA3. The versatile protein, p62, is involved in many cellular processes including autophagy and may play a role in the neurotoxic pathways that contribute to SCA3 and other neurodegenerative disorders. The two aims for this project were: the descriptive characterization of p62 pathology in UM134-1, a novel SCA3 human embryonic stem cell (hES) line; and determining whether reduction of mutant ATXN3 by antisense oligonucleotides (ASO) rescued p62 pathology in SCA3 stem cells. Results from western blot analysis and confocal imaging showed SCA3 stem cells formed co-localized p62 and ATXN3 puncta, which abnormally localized to the nucleus. Additionally, knockdown of ATXN3 following ASO treatment was not sufficient to rescue p62 to wildtype levels.

ENDURE TRAINEE ABSTRACT

KATHERINE FURMAN

Home Institution and State: **New York University, NY**
Email: **kf1239@nyu.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Neural Science, May 2019**
Mentors/Advisors at Home Institution: **Cristina Alberini, PhD; Chiye Aoki, PhD; and Margarita Kaplow, PhD**

ENDURE Trainee Scientific Interest:

My current research interest is, broadly, in the ways that sex hormones differentially regulate neurological processes in the male versus female brain. One particular facet of this topic that interests me is the differential regulation between the sexes of dopaminergic signaling in response to drug addiction, however there are many different parts of this field that I have not yet explored.

ENDURE Trainee Career Goals and Plan:

My career goal is to graduate in good standing with an undergraduate degree in Neural Science from New York University, and to then enter a PhD program in neuroscience. I plan to use my undergraduate career to gain as many research experiences as I can, to increase my knowledge of research practices and my understanding of varied topics in neuroscience.

ENDURE Trainee Summer Research Experience:

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

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

ENDURE Research Project Title**: Sex-differences in the effect of estradiol on cocaine-induced dopamine release: Role of selective estrogen receptors**

Women are more prone to escalating drug taking habits and relapse of addiction than men (Perry, Westenbroek & Becker 2011). Previous research shows that estradiol modulates this difference in clinical research and rodent models, through actions on mesolimbic dopamine (DA) systems (Yoest, Cummings & Becker 2015). Our lab has shown that estradiol enhances effects of cocaine on DA release in the Nucleus Accumbens (NAcc) of females and not males. The specific estradiol receptor modulating this effect is not known. To measure dopamine release in response to cocaine, we used Fast-Scan Cyclic Voltammetry (FSCV) after treating animals with either pyrazole propyl triol (PPT), an ER-selective agonist, diarylpropionitrile (DPN), an ER-selective agonist, or the non-selective agonist, estradiol benzoate (EB). Acute EB treatment significantly increased effects of cocaine on stimulated DA release in NAcc of females but not males, consistent with previous lab findings. EB significantly increased effects of cocaine on stimulated DA release in NAcc of females more than PPT but not DPN. Males treated with PPT show enhanced effect of cocaine on DA reuptake. We conclude that ER modulates effects of cocaine on dopamine reuptake in males, and ER modulates effects of cocaine on dopamine release in females.

ENDURE TRAINEE ABSTRACT

D'NEA GALBRAITH

Home Institution and State: **Hunter College, NY**
Email: **dnea.galbraith@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology, Neuroscience Concentration, 2018**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

My interests have been rooted in my study of 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 other brain regions that may be altered in a persistent manner as a result of chronic stress exposure. Finally, I want to explore possible pharmaceutical or nutraceutical interventions to help prevent the possible negative effects of chronic stress and traumatic memories in these regions, and explore alternative medicines to treat current mental and psychiatric disorders.

ENDURE Trainee Career Goals and Plan:

As a highly motivated and goal-oriented undergraduate student at Hunter College, I have taken many steps towards maximizing my success. I have been able to find my true interests, passions, and goals by working as an undergraduate researcher for the last two years. As I have had extensive lab experience, I am now ready to broaden my scope of knowledge by taking the necessary steps to pursue my goal of becoming a physician-scientist. I am interested in becoming a medical doctor in the field of neurology and focusing my professional research on the discovery of medicines to improve neural deficits and disorders.

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 Early Life Stress on Medial Preoptic Area Development**

Early life stress (ELS) increases the lifelong risk for pathology and can impact future parental care. Here, we used a mouse model of ELS in the form of restricted maternal bedding from postpartum days 4-11, examining whether ELS would lead to a significant disturbance in maternal behavior, and alter the development of key brain centers regulating future parental behavior of offspring raised in ELS environments. We carried out comprehensive analysis of the effects of ELS on maternal behavior using continuous automated video tracking and hand scoring. Maternal behavior was assessed over the circadian cycle during postpartum days 3-12. We assessed the effects of ELS on neural development, focusing on the development of the medial preoptic area (MPOA) of the hypothalamus, a sexually dimorphic brain region that is crucial for the expression of parental behavior. We hypothesized that ELS would alter, maternal behavior, cellular development, and sexual differentiation within the MPOA. We collected tissue punches of the MPOA of offspring reared in ELS and measured developmental changes in gene expression using real-time quantitative PCR. We found that the chronic ELS paradigm brings about behavioral changes in maternal care as well as developmental changes in cellular maturation within the medial preoptic area.

ENDURE TRAINEE ABSTRACT

SACHA McELLIGOT

Home Institution and State: **New York University, NY**
Email: **skm440@nyu.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Neural Science, May 2019**
Mentors/Advisors at Home Institution: **Thomas Wisniewski, MD, and Eleanor Drummond, PhD**

ENDURE Trainee Scientific Interest:

I have conducted research in various facets of neuroscience, and thus remain interested in preserving a multifaceted approach to research. Namely, the application of computational methods and creativity to neurological phenomena which are otherwise approached using standard bench techniques. I am currently working for Dr. Thomas Wisniewski characterizing various processes and pathways in Alzheimer's disease.

ENDURE Trainee Career Goals and Plan:

I hope to pursue a professional career in neuroscience research and further hope to supplement that research career with a teaching one, achieving a professorship at an established university.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Catherine Collins, PhD**

ENDURE Research Project Title: **Characterizing Mechanisms of Debris Clearance and Changes in Global Protein Synthesis After Axonal Injury**

Axons are perhaps the most vulnerable and exposed components of neuronal circuitry, and are thus equipped with various mechanisms for injury response. A severed axon is divided into two portions: proximal and distal, characterized by whether the portion remains connected to the cell body. Degeneration of the distal portion, which no longer receives input from the soma, is a crucial component of the regenerative process for injured neurons. Wallerian Degeneration involves the fragmentation and degradation of the distal portion, the chronology of which has been well characterized. However, little is known about the processing of the debris during the degenerative process. Using Drosophila melanogaster larvae, we conducted nerve crush assays in which the motor neuronal nerves were severed in-vivo? and tracked the development of various components of the injured neurons. Wielding the technique, FUNCAT, we tracked the presence and synthesis of proteins in the motoneurons of each organism, detecting changes in global translation as a result of axonal injury. We found that, 48 hours post-injury, there was a significant enrichment of proteins in the proximal stumps. It was further observed that the contents of the distal stumps were located outside the nerve membrane 24 hours after injury. These findings highlight potential mechanisms of debris processing of the distal stumps of injured axons, as well as the translational changes that follow such injury.

ENDURE TRAINEE ABSTRACT

ITZIK NAHMOUD

Home Institution and State: **Hunter College, NY**
Email: **Itzik.nahmoud63@myhunter.cuny.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biochemistry, May 2019**
Mentors/Advisors at Home Institution: **Ekaterina Likhtik, PhD**

ENDURE Trainee Scientific Interest:

As a student originally pursuing solely an MD degree due to my interests in medical treatment, I began to better inform myself of the scientific bases on which medicine builds its grounds. Since then, I have been heavily involved in research, particularly the network circuitry of behavior, and aim to continue in this behavioral neuroscience route.

ENDURE Trainee Career Goals and Plan:

I am pursuing a career as a physician-scientist and plan to specialize in a neurological field of research and treatment.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Michael Cooper, MD, and Juan Valadez, PhD**

ENDURE Research Project Title: **Identification of Surrogate Markers for Malignant Cell Types in Anaplastic Astrocytomas**

Identification of acquired mutations that regulate the growth of anaplastic-astrocytomas offer the promise of developing novel targeted therapies for this currently incurable brain cancer. Somatic mutation in the IDH1-R132H gene occurs in more than 70% of cases and is thought to be inherited in all progeny, even prior to P53 mutation, making it an ideal therapeutic target. Data from our laboratory indicate that IDH1 mutation may not be present in all glioma cells, however, and that not all of the cancer cells may be treated by targeting this specific molecular alteration. To investigate IDH1 mutational mosaicism further, we analyzed a series of anaplastic-astrocytomas for the overexpression of p53 as a surrogate indicator of malignant cells with TP53 alterations. By co-immunofluorescence staining, cells were scored for p53 and IDH1-R132H expression. Cells that overexpressed p53 in the absence of IDH1-R132H expression could be identified and quantified in 17/18 IDH-mutant specimens. Further, in two patients who received a second resection, expansion of the p53-positive/IDH1-R132H-negative cell population was measured. These findings suggest that IDH mutation may be subclonal and that surrogate markers may be used to identify and quantify glioma subclones to evaluate their impact on prognosis and response to therapies.

ENDURE TRAINEE ABSTRACT

ALEC SEIDENBERG

Home Institution and State: **Hunter College, NY**
Email: **alec.seidenberg57@myhunter.cuny.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology, 2018**
Mentors/Advisors at Home Institution: **Allyson Friedman, PhD**

ENDURE Trainee Scientific Interest:

I have become fond of Neuroscience due to its inherently objective contributions to psychiatric practice. Provided my limited practical experience as a scholar of the behavioral sciences, coupled with a newly-found critical perspective on behavioral healthcare provision, it is apparent to me that the increasingly interdisciplinary field(s) is hindered by contradicting theoretical bases and thusly confounding therapeutic methods. It is my belief that advancements in neuroscience, in behavioral neuropsychology, specifically, may provide a universal, biological framework for the facilitation and coordination of assessments, treatments, maintenance, and possibly prevention of psychiatric symptom onset.

ENDURE Trainee Career Goals and Plan:

It is my hope that a PhD in neuroscience will empower me to positively affect the academic community as well as neurologically diverse individuals by providing me the opportunities to research and educate coming generations about how humanity may improve upon its condition by acting as informed stewards of our neurological assets.

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: **Jennifer Blackford, PhD**

ENDURE Research Project Title: **Intrinsic BNST Function in Post-Traumatic Stress Disorder**

Post-Traumatic Stress Disorder (PTSD) is a prevalent and debilitating disease that affects up to 30% of military veterans. Imaging studies have focused on the amygdala, a core component of fear neurocircuitry. However, preclinical research shows that while the amygdala mediates short-term fear behavior, another brain region, the bed nucleus of the stria terminalis (BNST), mediates the sustained anxiety, hyper-vigilance, and hyper-arousal behaviors characteristic of PTSD. It remains unknown whether BNST function is altered in PTSD. Utilizing neuroimaging, we will test the hypothesis that veterans with PTSD have increased baseline BNST activity relative to veterans without PTSD and healthy controls. Intrinsic brain function of veterans with PTSD (n=14), veterans without PTSD (n=19) and healthy controls (n=14) were assessed using a resting state functional magnetic resonance imaging (rsfMRI) scan. We determined the amplitude of low frequency fluctuations (ALFF) and fractional-ALFF to assess baseline BNST and tested group differences using an Analysis of Variance. No group differences were found in BNST activity at rest. BNST ALFF scores were high across all participants. Participants with PTSD had significantly heightened activity in the amygdala, hippocampus, and insula consistent with previous studies. Observed differences in neuroimaging may hold promise for identifying potential biomarkers associated with PTSD.

ENDURE TRAINEE ABSTRACT

JORDY SEPULVEDA

Home Institution and State: **Hunter College, NY**
Email: **jordysepulveda93@gmail.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Biological Sciences, Fall 2018**
Mentors/Advisors at Home Institution: **Maria E. Figueiredo-Pereira, PhD**

ENDURE Trainee Scientific Interest:

I am a third-year undergraduate majoring in biology at the City University of New York Hunter College. I am driven to understand the pathophysiology of neurodegenerative diseases such as Parkinson's disease, Alzheimer's disease and Huntington's disease from a molecular and cellular level. As an undergraduate student, I aspire to understand the different aspects of neurodegenerative disease such as the pathological hallmarks, cellular pathways underlying gene-environment interaction in toxicant vulnerabilities, and the role of neuroglia cells in neuronal degeneration. I aim to one day contribute to the neuroscience field with a therapeutic strategy in the prevention and treatment of neurodegenerative diseases.

ENDURE Trainee Career Goals and Plan:

My first experience doing research was at La Guardia Community College where I studied the role of microglial cells in the pathogenesis of Alzheimer's disease. Since then, I have been interested in pursuing a PhD in neuroscience with an aim in studying the role of microglia which could be a therapeutic target in the prevention and treatment of neurodegenerative diseases.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Aaron Bowman, PhD**

ENDURE Research Project Title: **BDNF and Select Ion transporters altered after Manganese exposure: A mouse model of Huntington's Disease**

Huntington's disease (HD) is a neurodegenerative disorder caused by an expanded CAG repeat in the huntingtin gene (HTT). Mn dyshomeostasis in the brain has been reported in both cell and mouse HD models, suggesting an impairment in Mn absorption, metabolism, or transport in HD. Brain derived neurotrophic factor (BDNF) promotes the survival and maturation of medium spiny neurons (MSNs). We hypothesize Mn absorption and transport is altered in HD and Mn dyshomeostasis modifies signaling pathways regulating neuronal survival and proliferation. Twelve-week old YAC128Q male and female mice expressing mutant HTT, as well as wild-type (WT) littermates, received subcutaneous injection of 13.88mg/kg Mn or vehicle (H20) for 0 hrs, 1 hr, 4 hrs, 24hrs, and 1 week prior to sacrifice. Mn responsive genes such as BDNF and S100A9 were measured (using rt-PCR) in the liver, cortex, and striatum. Cortical WT BDNF decreased after Mn exposure ($p<0.05$). Hepatic and cortical HD S100A9 levels spiked after Mn exposure ($p<0.05$). This suggests Mn dyshomeostasis affects neuronal survival by decreased BDNF in HD, and different ion transporters are recruited to reestablish Mn homeostasis. Therefore, sensitizing HD mice to the effects of Mn may be effective in rescuing rescue some aspects of HD pathology.

ENDURE TRAINEE ABSTRACT

MUYU SITU

Home Institution and State: **Hunter College, NY**
Email: **msitu1995@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology with Neuroscience Concentration, January 2018**
Mentors/Advisors at Home Institution: **Amber Alliger, PhD**

ENDURE Trainee Scientific Interest:

My current research interests revolve around understanding the mechanisms between brain and behavior, specifically in disorders related to stress and anxiety. I am interested in the impact of internal factors, such as genetic influences and chemical disparity in the brain, on behavior in both human and non-human subjects.

ENDURE Trainee Career Goals and Plan:

In order to study these mechanisms, I plan to apply to a program that works with the behavioral and molecular aspects of stress. The objective of my future research is to improve techniques in understanding the biological and molecular effects of stress and anxiety in hopes to apply it in a therapeutic process. As a senior majoring in psychology with a neuroscience concentration, I plan to continue to obtain my PhD in neuroscience. Afterwards, I will continue working in research and teaching the concepts of neuroscience.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Saba Baskoylu, Jeremy Lins, and Anne C. Hart, PhD**

ENDURE Research Project Title: **Searching for Locomotion Defects in a *C. elegans* Model of Amyotrophic Lateral Sclerosis**

Amyotrophic Lateral Sclerosis (ALS) is a fatal neurodegenerative disease that gradually results in motor neuron loss within the spinal cord and motor cortex. Currently, ALS has no known cure, and the mechanism by which motor neurons die has not been identified. Mutations of the DNA/RNA binding protein FUS (fused in sarcoma) are associated with neurodegeneration that results in familial ALS, causing premature onset of the disease, and mutations in FUS causes stress sensitivity. However, the pathway through which FUS mutations lead to neurodegeneration is not clearly understood. One such gene that could act downstream of FUS is DJ-1, which is important for cell protection against oxidative stress; however, mutations in this gene infrequently causes ALS. To determine this, we used assays to find locomotion defects in the FUS ALS model and look for genes whose loss of function will suppress these defects. In this study, we use *C. elegans* to model FUS mutations in ALS to determine if DJ1 acts downstream of FUS in a pathway by promoting neurodegenerative effects; thus, this will provide insight into ALS pathways and a potential therapeutic target.

ENDURE TRAINEE ABSTRACT

CATHERINE UBRI

Home Institution and State: **Hunter College, NY**
Email: **catherine.ubri35@myhunter.cuny.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date:
Mentors/Advisors at Home Institution: **Nesha Burghardt, PhD**

ENDURE Trainee Scientific Interest:

I'm interested in understanding how development as a marginalized member of society contributes to self-regulatory and decision-making abilities both at the neurobiological and behavioral level. Additionally, I hope to investigate how they affect social outcomes, and whether any detrimental effects can be repaired via naturalistic methods such as interventions.

ENDURE Trainee Career Goals and Plan:

Upon graduating Hunter College, I hope to immediately begin my doctorate training and investigate neurobiological correlates to self-regulation and decision making in individuals that are socially or economically disadvantaged. Once I attain my doctorate, I hope to investigate this population more closely. Specifically, in the event that I find detrimental effects to support current and prospective studies on the marginalized population, I will work to develop interventions and give marginalized individuals support in the form of both my research and outreach to provide intervention options, access to necessary resources, and scientific support.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Clancy Blair, PhD; Rosemarie Perry, PhD; and Stephen Braren**

ENDURE Research Project Title: **Inclusive peer environments remediate social behavioral disturbances following early-life stress rearing**

It is well-established that early-life stress is associated with disrupted social development. Current interventions for at-risk children target the improvement of caregiver-child relationships to optimize the context in which a child's social learning occurs. However, there is a lack of research assessing the ability of peer-to-peer relationships to influence social development following adversity. The present study investigated if peers influence social development following exposure to early-life stress, using a rodent model. Subjects were assigned to control or early-life stress rearing conditions from postnatal days (PN)8-12. At weaning, rats were assigned to matched (two animals from same rearing condition) or mismatched peer housing conditions (one early-life stress, one control animal). At PN37-47 social behavior was assessed, and glucocorticoid receptor (GR) levels were quantified in the medial prefrontal cortex (mPFC) and dorsal hippocampus (dHC). Results showed that early-life stress reduced social motivation behavior, which correlated with heightened GR levels in the dHC and mPFC. However, the co-housing of early-life stress and control rats repaired social motivation levels of the early-life stress cagemate, without affecting the social development of the control reared cagemate. Our results provide a novel manipulation of peer relationships that supports the remediation of altered social behavior following early-life stress.

ENDURE TRAINEE ABSTRACT

KATHERINE VARELA

Home Institution and State: **Hunter College, NY**
Email: **katherine.varela33@myhunter.cuny.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Psychology, Fall 2018**
Mentors/Advisors at Home Institution: **Chiye Aoki, PhD, NYU**

ENDURE Trainee Scientific Interest:

Conducting research on homeostatic plasticity, my mission is to stabilize malfunctions in synaptic networks that control aspects of cognitive functionality. I believe that particularly focusing on environmental enrichment, will have an impact on synaptic morphology and homeostatic stability.

ENDURE Trainee Career Goals and Plan:

As a BP ENDURE scholar, my goal is to pursue a PhD in molecular neuroscience, to study homeostatic plasticity mechanisms in the neurological impaired brains. Ultimately, I plan to use this degree to help demographics with neurological impairments improve their abilities in information acquisition and aid their cognitive development.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Michael Sutton, PhD**

ENDURE Research Project Title: **Proteasome-Dependent Regulation of Presynaptic Tomosyn Expression: A Potential Mechanism for Homeostatic Regulation of Neurotransmitter Release**

Homeostatic plasticity promotes stability in neural circuits through adaptive changes in neural excitability and synaptic function. When activity is elevated, compensatory downscaling of synaptic function can push firing rates back to average levels. When activity is diminished, upscaling of synaptic function and excitability can restore stable activity patterns in networks. Our previous work has demonstrated that AMPA receptor blockade drives an increase in presynaptic neurotransmitter release through the mTORC1-dependent postsynaptic synthesis and release of Brain Derived Neurotrophic Factor (BDNF). Recently, we have found a critical presynaptic role of the ubiquitin proteasome System (UPS) in gating these BDNF-dependent effects on release. Here, we investigate a potential role for a negative regulator of synaptic vesicle mobility and release, Tomosyn-1, as a target for UPS degradation downstream of BDNF-induced signaling. Rat hippocampal neurons (~21 DIV) were treated with BDNF (250 ng/ml; 60 min) in the presence or absence of the proteasome inhibitor lactacystin (10 uM) and stained for Tomosyn-1, as well as VGLUT1 to identify excitatory presynaptic terminals. We found that BDNF induces a significant loss of Tomosyn-1 expression at VGLUT-1 positive terminals, an effect that is blocked by coincident inhibition of proteasome activity. We are currently examining the dynamic regulation of Tomosyn-1 expression by monitoring expression of recombinant Tomosyn-1 coupled to fluorescent and photo convertible tags. Our results indicate that BDNF negatively regulates Tomosyn-1 expression in presynaptic terminals via the UPS, which may link postsynaptic signaling to alterations in neurotransmitter release.

NEUROSCIENCE RESEARCH OPPORTUNITIES TO INCREASE DIVERSITY (NeuroID)

UNIVERSITY OF PUERTO RICO RIO PIEDRAS
Principal Investigator: *Dr. Jose García-Arrarás*
Principal Investigator: *Dr. Carmen S. Maldonado-Vlaar*
Partner Institutions: Interamerican 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

JOSEPH BLOOM

Home Institution and State: **Universidad Metropolitana, PR**
Email: **josephbloom07@yahoo.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **2018**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

My main scientific interests are biochemistry, proteomics and bioinformatics. My primary research interest is the bioinformatic analysis of the nAChR involved in Alzheimer's and Parkinson's disease.

ENDURE Trainee Career Goals and Plan:

After I graduate from my BS in cellular-molecular biology, I will pursue a doctoral degree in bioinformatics, and work in the biomedical industry as a bioinformatics researcher.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Puerto Rico**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Jose Lasalde-Dominicci, PhD, and Jose D. Otero, PhD**

ENDURE Research Project Title: **Characterization of functionality and stability of *Torpedo californica***

The nicotinic acetylcholine receptor (nAChR) is the primary receptor in muscle for motor nerve-muscle communication that controls muscle contraction. Over the course of three decades, the nicotinic acetylcholine receptor of the pacific electric ray *Torpedo californica* has been extensively characterized through detergent-lipid solubilization, due to its similarity to the human nAChR. However, the molecular mechanisms of detergent-lipid-protein interactions of solubilized membrane proteins is a largely unexplored research field. Recent studies have found that lipid-analog detergents maintain stability and ion channel function for the nAChR. The purpose of this investigation is to determine functionality and stability of the nAChR receptor. The investigation is divided into two parts: (1) sample preparation, which is critical for maintaining receptor stability in the detergent complex, and (2) macroscopic electrophysiology, which is employed for characterizing functionality. For protein sample preparation, we first purified the nAChR by sodium cholate solubilization, followed by affinity chromatography and protein reconstitution into lipid vesicles. Protein concentration of the sample was determined by the BCA method. Our results suggest that protein sample preparation was successful due to an obtained high concentration of nAChR. Preliminary trials to determine receptor functionality will be executed using the two-electrode voltage clamp technique on *Xenopus laevis* oocytes.

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, December 2017**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

My research interests are in molecular neuroscience and neuroimmunology. I am interested in studying the pathways that underlie the immune response to different neurological disorders and addictions.

ENDURE Trainee Career Goals and Plan:

As a graduating senior, I am applying to graduate school for a PhD in biomedical sciences. I am interested in the dual degree MD/PhD, where I can combine my interest in neuroscience/immunology research and clinical research.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Robert Spencer, PhD**

ENDURE Research Project Title: **Activation of Oxytocin Target Neurons after social interaction of female rats**

Social behavior is known to be necessary for proper development. However, despite its advantageous effects, social interactions tend to decline with age. Previous studies have found differences in the induction of c-Fos gene, a neuronal activation marker, which increases after the introduction of a social partner in young compared to older adult rats. Females also exhibited higher c-Fos expression than males in the bed nucleus of the stria terminalis (BNST). Our study focuses on determining whether oxytocin target (OXT) neurons, that project to the BNST, are responsible for the differences in activation between young and older female rats. We will use fluorescence in situ hybridization to measure the OXT neurons that have c-Fos gene activation in the BNST of the brain, and use cell counts to determine ratios of how many OXT neurons have c-Fos activation. We expect to see a higher activation of OXT neurons with c-Fos in young versus adult female rats after a brief social interaction with a rat of the same age. This suggests that changes in OXT neurons may lead to decrease in neuronal activation after a social behavior, explaining why older rats become less receptive to social interactions. Studying the neural circuits underlying impaired social behavior with aging may lead to insights on brain changes in the elderly and understand whether aging is related to changes in neuronal activation of stress and anxiety related circuits.

ENDURE TRAINEE ABSTRACT

ABDIAS DIAZ

Home Institution and State: **University of Puerto Rico-Rio Piedras, PR**
Email: **abdias415@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Molecular Biology, 2018**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

Im interested in testing the mechanisms of the defense of the human brain, its response and its immunological action over external assaults.

ENDURE Trainee Career Goals and Plan:

After graduating I am planning to attend grad school and obtain a PhD in neuroscience so that in the future I can be part of the academia.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution:

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title: **Effects of Early-Life Morphine Exposure on Response to Cocaine in Adulthood**

One big challenge scientists are now facing is to understand which are the long-term effects of administering morphine, during early life, to children. It is known that early life morphine administration may regulate the drug seeking behavior of mice during adulthood. Because of such reason, the aim of my project was to evaluate the response to cocaine during adulthood in mice that were treated with morphine during their gestational period until their birth and either kept with morphine after birth or treated with saline.

ENDURE TRAINEE ABSTRACT

VICTORIA ENCARNACION

Home Institution and State: **University of Puerto Rico-Rio Piedras, PR**
Email: **victoria.encarnacion@upr.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Chemistry, May 2018**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

My research interest as an undergraduate student is to enroll in a neuroscience PhD program. A PhD program would be an amazing opportunity for expanding my research experiences. It would be a privilege to be able to continue working in the field that I am most passionate about. I am certain that my scientific knowledge and laboratory techniques will be amplified. Many of my skills would be enhanced with the preparation and professional workshop that a PhD program provides.

ENDURE Trainee Career Goals and Plan:

I am senior student in the University of Puerto Rico in the College of Natural Sciences, expecting to achieve a Bachelor's degree in chemistry. The experiences that I have gained during college will aid me in my career as I pursue a PhD in the neuroscience field. I am very interested in research experience in the field of physiology and cognition. Therefore, forming part of a diverse research workforce can help me to expand my curiosity, knowledge and overview about this field.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution:

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title: **Hyperpolarization-Activated Cation Current (Ih) Channel Subunit HCN2: Role on the Development and Expression of Cocaine 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-Rio Piedras, PR**
Email: **paola.figueroa2@upr.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Molecular and Cell Biology, May 2018**
Mentors/Advisors at Home Institution: **José E. García-Arrarás, PhD, and Carmen Maldonado-Vlaar, PhD**

ENDURE Trainee Scientific Interest:

As an undergraduate student, I have developed and pursued an interest of understanding the molecular, cellular and epigenetic mechanisms involved in neurodegeneration and regeneration of the nervous system. By addressing signaling pathways that play a role throughout embryogenesis and development we would be able to understand how to activate, maintain and regulate regeneration mechanisms in degenerated tissues.

ENDURE Trainee Career Goals and Plan:

Upon receiving my bachelor's degree in molecular and cell biology from the University of Puerto Rico-Rio Piedras, I aim to pursue a PhD in molecular biology focusing my research towards developmental neuroscience. Afterwards, I intend to follow a career in academia and science policy, as it is important to offer opportunities to next generation scientists and maintain science relevant and in the forefront of society and politics.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Elizabeth R. Gavis, PhD, and Hendia Edmund**

ENDURE Research Project Title**: The role of canonical Wnt signaling pathway in regulating neuron morphology**

Neurons are specialized cells that receive and transmit electrical and chemical signals. Neuronal dendrites are essential for signal transduction and adopt diverse morphologies that aid their function. Therefore, dendrite branch patterning is strictly controlled and maintained during development. Defects in signaling pathways important during development or cell regulation can be attributed to defects in neuron morphology (NM), specifically under- or over-branching. Post-transcriptional regulation, specifically the localization of certain mRNAs, has been implicated in D.melanogaster sensory neuron morphogenesis, where their expression governs branch patterning and sensory field formation. A serine/threonine kinase, Frayed (fray), was identified in a genome-wide screen for dendritically localized mRNAs in class IV dendritic arborization (da) neurons. RNA interference (RNAi) knockdown of fray results in a significant increase in the number of terminal branches (NTB), while overexpression yields dramatically under-branched neurons. Fray is phosphorylated by Wnt target Wnk, to regulate ion channel activity and expression of several transcription factors. Wnt signaling has been studied extensively; however, the role of canonical Wnt pathway in NM and function is unclear. For this reason, RNAi was used to knockdown canonical Wnt pathway component expression and assess morphological defects in third instar larval class IV da neurons. The b-catenin homolog armadillo (arm) acts as a master regulator of canonical Wnt. Arm protein translocates into the nucleus where it activates dishevelled (dsh) transcription. Statistical analysis of the

NTB and loss-of-self-avoidance in class IV da neurons expressing arm and dsh RNAi may reveal a role for NM regulation. Furthermore, if a loss of dsh and arm rescues fray overexpression phenotype it would suggest fray acts downstream of both arm and dsh. Identifying proteins involved in signaling cascades could provide insight towards neurological diseases associated with morphological defects and potentially drive novel treatments.

ENDURE TRAINEE ABSTRACT

SOL FONSECA MONTES

Home Institution and State: **University of Puerto Rico-Rio Piedras, PR**
Email: **sol.fonseca@upr.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **May 2018**
Mentors/Advisors at Home Institution: **Carmen S. Maldonado-Vlaar, PhD**

ENDURE Trainee Scientific Interest:

I am interested in researching neurodegenerative diseases and incorporate different types of exercises as a component of rehabilitation. For this I am interested on the HPA axis and its effects after exercise. On the other hand, I am interested in researching addiction relapses using exercise as one of the means of relapse prevention.

ENDURE Trainee Career Goals and Plan:

My academic goal is to obtain a PhD in neuropsychology, I would like to do research on mental diseases such as Alzheimer's, Parkinson's and epilepsy. For this, I am interested on researching brain development and plasticity, cognition and memory. I consider the human memory fascinating and complex, as well as the processes of assimilation, perception and learning and analysis, especially within the early stages of childhood. Aside from finding this fascinating, I believe that it is necessary to learn and understand well these stages to be able to work inside any field of psychology.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Edward A. Wasserman, PhD**

ENDURE Research Project Title**: Pigeons' Tracking of Relevant Information in Category Learning**

This summer I work at Dr. Wasserman's comparative cognitions lab. Our project aimed to see how selective attention and learning work by presenting pigeons with a categorization discrimination task. Our preliminary findings suggest that in order for learning to increase, it is necessary to engage in selective attention.

ENDURE TRAINEE ABSTRACT

MARCELO FRANCIA

Home Institution and State: **University of Puerto Rico-Rio Piedras, PR**
Email: **marcelo.francia@upr.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Cellular and Molecular Biology, 2019**
Mentors/Advisors at Home Institution: **José Agosto, PhD; Carmen S. Maldonado, PhD; and José García-Arrarás, PhD**

ENDURE Trainee Scientific Interest:

My main interest is to study the mechanisms that can cause a mental illness. Specifically, I want to research the possible neuronal pathways involved in bipolarity disorder and chronic depression, in order to improve our understanding of these illnesses and treatments.

ENDURE Trainee Career Goals and Plan:

After I finish my bachelors degree, I want to pursue a PhD in neuroscience. I haven't decided yet if I want to focus on behavioural neuroscience or molecular neuroscience. With my PhD I would work on research and academia. Eventually I imagine myself with my own lab to answer my own questions.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution**: University of Puerto Rico**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Jose Agosto, PhD**

ENDURE Research Project Title**: The effect of chronic sleep deprivation in the expression of Bruchpilot**

Sleeping is a process necessary for the mental and physical recovery of many complex organisms. Deprivation of this process has been known to affect the cognitive ability of an individual and has been associate as a symptom for mental pathologies, such as bipolar disorder and clinical depression. After acute sleep deprivation, there are changes in the amount of synaptic proteins, such as that presynaptic protein Bruchpilot (BRP) rises. This protein has been associated with the structure of synaptic active zones, thus indicating a participation with the mechanisms that regulate sleep. However, these mechanisms are mostly unknown. Using immunohistochemistry for BRP in drosophila brains we want to establish a method for quantifying synaptic connections. So far we have established a protocol for BRP staining and image analysis, but we still have yet decided a procedure for its quantification.

ENDURE TRAINEE ABSTRACT

RUBEN GARCIA

Home Institution and State: **Universidad Metropolitana, PR**
Email: **rubengarciareyes@gmail.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Psychology, May 2019**
Mentors/Advisors at Home Institution: **Jose E. Garcia-Arrarás, Ph.D. at the University of Puerto Rico, Rio Piedras Campus.**

ENDURE Trainee Scientific Interest:

Ever since I discovered neuroscience, I became extremely passionate about neural regeneration, neurogenesis, and neural stem cells. Through a 'wet lab' experience, I am mastering important molecular techniques to be applied to future experiments.

ENDURE Trainee Career Goals and Plan:

After I graduate from my home institution (Universidad Metropolitana, Cupey) while conducting research at the University of Puerto Rico-Rio Piedras Campus, I plan to pursue a PhD in neuroscience. Furthermore, I would like to specialize in neurogenesis and neural stem cells in the human brain. Moreover, as a faculty position becomes less attractive by the day, I am leaning towards an industry research career contributing to the field and to society from a less bureaucratic sector.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Azad Bonni, MD, PhD, and Cheng Cheng**

ENDURE Research Project Title**: Pathogenesis of Intellectual Disability: Regulation of PHF6 in Excitatory Synapse Development**

Intellectual disability (ID) is characterized by significant limitations in both intellectual functioning and in adaptive behavior. In Brjeson-Forssman-Lehmann syndrome (BFLS) patients, developmental delays are most commonly evident before the age of one. Mutations on PHF6 have been implicated in BFLS. PHF6 is expressed throughout the cerebral cortex and the expression level declines during postnatal cortical development. We have previously found that PHF6 regulates neuronal positioning. It is expected that PHF6 might have additional functions in cortical development. The disruption of PHF6 in BFLS is transmitted as an X-linked recessive trait causing neurodevelopmental disorders of cognition, which means the disorder is fully expressed predominantly in males. To further understand the pathogenesis of intellectual disability, we are investigating the function of PHF6 during cortical development. In particular, we are characterizing the function of PHF6 in regulating excitatory synapse development, including measuring dendritic spine shape and density using Golgi-Cox staining and the Neurolucida software. These studies should advance our understanding of PHF6 function in brain development.

ENDURE TRAINEE ABSTRACT

JORGE IRAVEDRA

Home Institution and State: **Universidad de Puerto Rico, PR**
Email: **jorge.iravedra@upr.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Cellular Molecular Biology, June 2019**
Mentors/Advisors at Home Institution: **Gregory Quirk, PhD, and Maria Diehl, PhD**

ENDURE Trainee Scientific Interest:

I'm interested in studying emotional regulation using rodent-based experimental designs. Specifically, I want to study the neural substrates that underlie complex and clinically relevant behaviors involved in the regulation of emotions. One such behavior is active avoidance, which is prevalent in anxiety treatments, phobic disorders and post-traumatic stress. Additionally, I'm also very interested in social behaviors and designing experiments to study these behaviors inside a clinical context. For instance, I'm very interested in designing experiments whereby rats that exhibit anxiety-like behaviors must elicit other-oriented emotional responses congruent with their interaction with other rats.

ENDURE Trainee Career Goals and Plan:

After finishing my undergraduate studies, I plan on pursuing a PhD in behavioral neuroscience. Afterwards, I'd complete a post-doc and subsequently look to become a PI in a medical center where I could also teach.

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: **Gregory Quirk, PhD, and Maria Diehl, PhD**

ENDURE Research Project Title**: Interrogating inputs to rostral prelimbic prefrontal cortex that drive active avoidance**

The neural mechanisms of active avoidance have garnered interest given their relevance in anxiety treatments and post-traumatic stress. Previous single unit studies revealed that inhibitory, not excitatory, tone responses in the prelimbic prefrontal cortex (PL) correlate with platform-mediated avoidance. Specifically, inhibited cells decreased their firing rate from 6 Hz to 2 Hz at tone onset. Using Channelrhodopsin, optical activation at 4 Hz in rostral PL (rPL), but not caudal PL, impaired avoidance during the tone, supporting the hypothesis that inhibitory responses in rPL are necessary for avoidance. However, rPL inputs that drive inhibitory responses during avoidance remain largely unknown. Here, we assessed the role of projections from the ventral hippocampus (vHPC) or the basolateral amygdala (BLA) to rPL, two known inputs of rPL, using optogenetics. Following avoidance training, we optically silenced inputs to rPL using Halorhodopsin during the first tone, but not the second tone, of a two-tone laser test. We found that silencing vHPC-rPL projections had no effect during the first tone, but impaired avoidance later during the second tone. Conversely, silencing BLA-rPL projections had no effect during either tone. These findings suggest that vHPC inputs to rPL have a role in driving avoidance and are consistent with this pathway's involvement in anxiety-like behaviors.

ENDURE TRAINEE ABSTRACT

CARLOS MARTINEZ

Home Institution and State: **University of Puerto Rico-Rio Piedras, PR**
Email: **carlos.martinez32@upr.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Chemistry, May 2019**
Mentors/Advisors at Home Institution: **José E. García-Arrarás, PhD**

ENDURE Trainee Scientific Interest:

My research interest is in molecular neuroscience and neurochemistry. Specifically, I am interested in the molecular and cellular processes surrounding regeneration of nervous tissue, such as gene expression, molecular signaling, and protein chemistry.

ENDURE Trainee Career Goals and Plan:

I plan to continue my undergraduate studies and graduate as a chemistry major. Additionally, I plan to further my studies by attending graduate school in order to work for and obtain a PhD in neuroscience or biochemistry. Once I obtain my PhD, my goal is to work as an industry research scientist.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution**: University of Puerto Rico-Rio Piedras, PR**

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

ENDURE Research Project Title**: Gene expression changes in cultured radial nerve cord explants**

The sea cucumber, *Holothuria glaberrima* is being used as a model organism to study nerve tissue regeneration. Although in vivo studies of the molecular processes surrounding sea cucumber nerve tissue regeneration have been previously carried out, no studies have been conducted using an in vitro setting. The aim is to assess the functionality of a novel in vitro technique by measuring Myc gene expression in the sea cucumber's radial nerve cords (RNCs). Removed RNCs were placed in antibiotic solution for 1 hour, and then in collagenase solution for 24 hours. They later incubated for 2 days in supplemented L15. Extracted RNA was analyzed with PCR for Myc expression. Spectrophotometry of RNA from 3 sea cucumbers showed a concentration of 69.5 ng/uL and absorbance ratios of 2.07 and 1.36 at wavelengths 260 nm/280 nm and 260 nm/230 nm, respectively. Electrophoresis showed bands for the Myc primers amplicon, and for the NADH primers amplicon. However, a band was observed in the no reverse transcriptase amplicon. The data obtained can be utilized in future in vitro, nerve tissue gene expression experiments. Expression of Myc and other genes using qPCR can be assessed later to better understand nerve tissue regeneration in holothurians.

ENDURE TRAINEE ABSTRACT

DAVID OJEDA

Home Institution and State: **University of Puerto Rico, Rio Piedras Campus, PR**
Email: **david.ojeda@upr.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Interdisciplinary Sciences, 2019**
Mentors/Advisors at Home Institution: **Carmen Maldonado Vlaar, PhD, and José E. García Arrarás, PhD**

ENDURE Trainee Scientific Interest:

I'm interested in the interaction between behavior and molecular constitution. This includes behaviors such as drug addiction, anxiety and fear with their respective molecular tendencies and particularities. I believe research in areas such as these have a profound social impact and their scientific potential function as a source of inspiration for my future work. Right now I'm focused in studying a specific protein called acid-sensing ion channel (ASIC1A) for its apparent contribution to the regulation of drug-seeking behavior.

ENDURE Trainee Career Goals and Plan:

I plan on finishing my undergraduate degree and being admitted into a PhD in cognitive science or behavioral neuroscience. I'm interested in continuing my research on drug addiction and, eventually, areas concerned with mental health. I believe these fields of research demand an interdisciplinary perspective and for this I plan to immerse myself in various topics that complement neuroscience. Long-term, I expect to become a university professor and investigator while also volunteering with international humanitarian organizations.

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: **Carmen Maldonado Vlaar, PhD, and José E. García Arrarás, PhD**

ENDURE Research Project Title: **Using immunohistochemistry and western blotting protocols for ASIC1A protein identification**

During my summer research internship, I was trained in Immunohistochemistry (IHC) and western blotting (WB) protocols. Both biochemical techniques are designed to identify changes in protein activity and function within selected brain regions. Both assays take advantage of the selective properties of antibodies, which only recognize an antigen with a specific amino acid sequence. These antibodies produce fluorescence or light as a by-product, thus permitting the visualization of specific structures in the visualized tissue. These techniques can therefore allow the precise assessment and identification of the acid-sensing ion channel (ASIC1A) protein. ASIC1A is an ion channel member of the Degenerin/Epithelial Channel family (DEG/ENaC) which can be activated by low extracellular pH levels. This protein has an essential molecular role in various drug related behaviors involved in associative learning and memory processes. The purpose of the present experiments was to detect changes in ASIC1A within dopamine mesolimbic structures following cocaine exposure. We used a 7-day cocaine or saline treatment protocol. Separate groups of male Sprague Dawley rats were daily injected with either 10mg/kg of cocaine-hydrochloride or 0.9% saline solution. Following the drug treatment, animals were euthanized and brain were dissected for the medial prefrontal cortex (mPFC), nucleus accumbens (NAcc), hippocampus and amygdala regions. Brain samples were prepared for IHC and western blotting analysis. It is expected an up-regulation of ASIC1A protein levels within NAcc and mPFC following cocaine treatment when compared to controls.

ENDURE TRAINEE ABSTRACT

ADRIANA PADILLA

Home Institution and State: **University of Puerto Rico-Rio Piedras, PR**
Email: **adriana.padilla2@upr.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Cellular and Molecular Biology**
Mentors/Advisors at Home Institution: **Alfredo Ghezzi, PhD; Carmen Maldonado, PhD; José E. García Arrarás, PhD; and Tugrul Giray, PhD**

ENDURE Trainee Scientific Interest:

My scientific and research interests are focused on epigenetics and neuroscience. The research that commonly sparks my attention relates to epigenetic responses to the environment which alter human behavior. More specifically, I appreciate studies involving genetics and the neuronal development of psychopathology. However, the fields of epigenetics and neuroscience also allow me to explore interdisciplinary aims. For instance, I am interested in the molecular and genetic component of the neurological states behind human creativity. The research interest I am currently concentrated in is alcoholism as a consequence of epigenetic modifications that alter receptors, synapses and circuits in the brain.

ENDURE Trainee Career Goals and Plan:

My long-term goal is to become a neuroscientist, and research the importance of epigenetics in the treatment of patients with mental disorders. I desire to develop projects that could expose the possibility of offering epigenetic therapeutic options in a functional clinical setting. I am inspired on how this research could dissolve the debate between nature and nurture, psychiatry and psychology. It could bring innovation to traditional paradigms concerning mental health. I plan on applying to several MD/PhD and PhD programs after college graduation. Currently, I am interested in exploring different fields within epigenetics and neuroscience like psychology, development and biochemistry.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Alfredo Ghezzi, PhD; Carmen Maldonado, PhD; and José E. García Arrarás, PhD**

ENDURE Research Project Title: **Reversing Addiction: Alcohol-induced Sleep Dysregulations Reveal Potential Targets for Pharmaco-epigenetic Interventions**

Sustained exposure to drugs leads to homeostatic adaptations in the brain brought on by responsive changes in gene regulation mechanics. These changes are known to be involved in the development of alcohol tolerance and dependence. Using *Drosophila melanogaster* as a model, we have observed epigenetic modulations brought on by ethanol exposure that look to restore a homeostatic balance by activating the expression of synaptic genes. We hypothesize that modulation of genes leads to an overall increase in the excitability state of neural circuits thus opposing the drug's inhibitory effect on the brain. Although genes and possible mechanisms involved in this development of alcohol tolerance have been uncovered, the use of an epigenetic reversible system as a potential pharmacologic treatment for alcoholism is still unknown. Here we exposed wild-type flies to a single dose of ethanol, and monitored their activity pattern to explore the effects of ethanol on sleep regulation. We find that ethanol exposed

flies were found to sleep more during the day despite showing a pattern of sleep immobility during the night similar to the unexposed flies. Results indicate that flies exposed to ethanol are not fully restoring their sleep during the night because they are making up for lost sleep during times of the day suggesting that the circadian mechanisms are affected by alcohol. Another drug that has been associated to the regulation of the circadian system is ketamine. Ketamine is a noncompetitive NMDA antagonist, and by studying its effect on gene regulation at synapses and its interaction with other drugs such as alcohol we might begin to understand how to modulate epigenetic adaptations involved in the persistence of tolerance and dependence in alcohol addiction. In the future, by exposing wild-type flies to a single low dose of ketamine and monitoring their sleep behavior we will be able to compare the effects of alcohol and ketamine separately to guide the determination of shared genes and pathways that are being epigenetically regulated.

ENDURE TRAINEE ABSTRACT

MARCOS SANCHEZ-NAVARRO

Home Institution and State: **Universidad Metropolitana, PR**
Email: **msanchez312@email.suagm.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **General Biology, 2019**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

I have had various research experiences in different fields of study. These experiences have helped me define my interests and determine that I intend to do research in biomedical sciences. Specifically, I wish to conduct research in molecular neuroscience.

ENDURE Trainee Career Goals and Plan:

I aspire to continue into academia and complete graduate studies in neuroscience. My goal is to become a researcher and establish my own neuroscience laboratory. Additionally, I wish to become a college professor and help promote this field of study.

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: **Gregory Quirk, PhD, and Freddyson Martinez-Rivera, PhD**

ENDURE Research Project Title: **Avoidance over-conditioning impairs extinction of fear, induces persistent avoidance, and increases use of safety cues: Implications for OCD**

Due to their repetitive nature, OCD compulsions are thought to resemble habit formation, but little is known about the effects of repetitive avoidance on subsequent extinction. Using a platform-mediated avoidance task, we recently reported that a minority of rats persist in their avoidance following extinction training with a barrier that prevents access to the platform (Ext-RP). In this experiment, we trained two groups of rats with either 8 days (8d) or 20 days (20d) of avoidance conditioning, followed by 4 days of Ext-RP and a subsequent test with the barrier removed. Both groups showed similar avoidance conditioning. During Ext-RP, however, the 20d group showed impaired extinction of freezing. Additionally, 20d rats showed increased avoidance at test compared to the 8d group, but did not display differences in freezing. Thus, the ability to re-access the platform eliminated the excessive fear in this group. To assess whether 20d group interpreted the barrier as a safety signal, an additional test session was run with the barrier placed opposite to the platform. Avoidance was reduced in the 20d group, suggesting the barrier signaled safety to these rats. We are currently using cFos to compare activity in prefrontal-striatal-amygdala circuits in the 8d and 20d groups.

ENDURE TRAINEE ABSTRACT

RICARDO TORRES-RAMIREZ

Home Institution and State: **Interamerican University of Puerto Rico, PR**
Email: **torresjricardo05@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology, 2018**
Mentors/Advisors at Home Institution: **Annabell Segarra, PhD**

ENDURE Trainee Scientific Interest:

Within the field of neuroscience, understanding differents mechanisms by which drugs affect behaviors is what drives my interest.

ENDURE Trainee Career Goals and Plan:

As a student interest in the field of neuroscience, my primary goal is to attend a neuroscience graduate program at a university whose laboratories would be a good fit for me. After getting my PhD degree, I plan to keep producing significant knowledge to the field of addiction through my research. In a distant future, I see myself as a professor contributing to the field of addiction and teaching.

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: **Annabell Segarra, PhD**

ENDURE Research Project Title: **Effects of Isolation Stress During Adolescence**

Stress is known to increase susceptibility to mental illness and alters behaviors. Yet, the effects of stress during adolescence, a stage characterized to be a one of neural development, are not clear. We are investigating how isolation stress during adolescence affects different behaviors stimulated by cocaine and how dopaminergic connectivity is affected due to isolation stress.

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; weekly neuroscience seminars during the academic year for the two years of the program; up to 3 semesters of neuroscience courses at Vanderbilt; research experiences in Vanderbilt neuroscience labs during the academic year; and summer research experiences including at Vanderbilt or one of the T32-funded neuroscience institutions (U. of Michigan, U. of Minnesota, and Oregon Health and Science University, Princeton University, University of Southern California) 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 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 (primarily African American) 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.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

DAVID BATTLE

Home Institution and State: **Tennessee State University, TN**
Email: **dbattle7@my.tnstate.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Biology, 2019**
Mentors/Advisors at Home Institution: **Lisa de la Mothe, PhD, and Hugh Fentress, PhD**

ENDURE Trainee Scientific Interest:

Molecular neuroscience with a concentration in Post-Traumatic Stress Disorder syndrome from traumatic experiences that damage mechanisms of emotion.

ENDURE Trainee Career Goals and Plan:

After receiving my undergraduate degree, I would like to peruse either a PhD or Masters in biomedical research with a concentration in neuroscience. Afterwards, I would like to work in a biomedical company looking for treatment for individuals who suffer from traumatic experiences.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Joseph Beatty, PhD**

ENDURE Research Project Title: **Dendritic spine analysis of striatal spiny projection neurons in the mouse model of fragile x syndrome**

Fragile X syndrome (FXS) is the most common form of inherited intellectual disability and the leading genetic cause of autism spectrum disorder. FXS is caused by a repeating CGG mutation in the FMR1 gene leading to a decrease in fragile X mental retardation protein (FMRP) and is highly expressed in neurons, especially in dendritic spines. Neocortical neurons from FXS patients and FMRI1 knock-out (KO) mice have an increased density of abnormally elongated dendritic spines, suggesting that the decrease of FMRP is linked to abnormal spine development, leading to alterations in synaptic transmission. The striatum is the input nucleus of the basal ganglia, a group of subcortical brain regions implicated in voluntary motor control and learning. In this study we performed two-photon laser scanning imaging of fluorescently labeled SP neurons from WT and Fmr1 KO mice. Image series in the z-plane of proximal and distal dendrites from SP neurons were used to count and classify dendritic spines into distinct subtypes based on shape and overall length. We hypothesize that the spine alterations seen in the neocortex of FXS patients and Fmr1 KO mice extends to the SP of the striatum and this morphological change can lead to alterations in synaptic transmission.

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Mentors/Advisors at Home Institution: **Lisa De la Mothe, PhD, and Hugh Fentress, PhD**

ENDURE Trainee Scientific Interest:

The scientific research that I am interested in is neuropsychiatric disorders, brain cognition, brain trauma and its effects. To be more specific, I would like to focus on minority and disadvantaged populations.

ENDURE Trainee Career Goals and Plan:

My primary career goal is to receive a PhD in neuropsychology. After receiving my PhD I hope to research neuropsychiatric disorders in minority populations. I hope to bring more awareness about neuropsychiatric disorders and bring assistance to communities that need it the most.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Tennessee State University, Neuroscience Education and Research Vanderbilt Experience (TSU-NERVE)**

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

ENDURE Research Project Title: **N/A**

My Endure Trainee Summer Research experience will begin Summer 2018.

ENDURE TRAINEE ABSTRACT

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Mentors/Advisors at Home Institution: **Hugh Fentress, PhD, and Lisa de la Mothe, PhD**

ENDURE Trainee Scientific Interest:

My research interests are in the area related to reward circuitry in the brain, specifically regarding sexual behavior. As motivation is a key process in the brain, further understanding reward consequences within the brain can uncover new drugs, or help refine therapeutics for sexual disorders.

ENDURE Trainee Career Goals and Plan:

The current plan is to eventually enroll into a MD/ PhD program in neuroscience after graduating from my undergraduate institution. Also, I may consider taking a gap year after graduating from undergraduate and performing research in under developed areas internationally. If not research, maybe health care improvement by helping in low developed hospitals around the world.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Robert Meisel, PhD**

ENDURE Research Project Title**: Probing the Role of the Medial Prefrontal Cortex in Female Sex Behavior**

It is typically thought that animals engage in sex primarily for means of reproduction. However, all animals, including humans, actually perform this motivated behavior for its rewarding consequences. Studies in the lab have demonstrated increased activity from sex in the nucleus accumbens (NAc), a key region of reward circuity, as well as in the medial prefrontal cortex (mPFC), an area known for its involvement in goal-directed behavior. Since the mPFC provides glutamatergic afferents to the NAc, our lab wanted to determine if activation that is seen in mPFC and NAc are related to the same circuitry. To do this, we examined the expression of c-Fos in inhibitory (GABA) and excitatory (glutamate) neurons in the mPFC to elucidate which cell type is activated during sex to determine whether the mPFC is driving the NAc activity. The mPFC neurons were labeled for both c-Fos, a marker of activation, as well as a marker for GABA, glutamic acid decarboxylase (GAD). Results suggests that sex activates c-Fos primarily outside of GABAergic cells in the glutamate neurons of the mPFC, neurons forming the primary output to the NAc. These results implicate the mPFC and NAc as integrated structures in reward circuitry in female sex behavior.

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ENDURE Trainee Scientific Interest:

My research interests focus on biomedical research related to neuropharmacology. I am specifically interested in the neural mechanisms underlying addiction including the pathways and molecular features that underlie substance related disorders.

ENDURE Trainee Career Goals and Plan:

I plan to attend a medical school or an MD/PhD after my graduation from Tennessee State University and focus on neuropharmacology and understanding more about the interaction of various substances with the reward system in the brain.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution**:**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Kathleen Page, MD, and Pat Levitt, PhD**

ENDURE Research Project Title**: Effects of Physical Activity and Sedentary Behavior on Brain Responses to High-Calorie Food Cues in Obese and Lean Young Adults**

The research project examined the relationship between time spent performing physical activity/sedentary behavior, and the brain's response to high-calorie food cues, which is known as junk food. The physical activity data was collected through the use of Physical Activity Recall Questionnaire (PAR). Participants were shown high calorie food cues and non-food cues, and brain activity data was gathered through the use of fMRI. Whole brain analysis, and ROI analysis were done to explore the relationship between MVPA minutes and neural food cue reactivity within the whole brain. After data analysis, it was shown that MVPA may have beneficial effects on brain regulation of feeding behavior in both lean and obese individuals by decreasing activation to high calorie food cues. Alternatively, SB was shown to contribute to higher food activity in obese people. This study and others can be used to further analyze the role of behavior on weight maintenance and cardiovascular health.

ENDURE TRAINEE ABSTRACT

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ENDURE Trainee Scientific Interest:

I am interested in any behavioral neuroscience research as this can be used to help understand human behavior and develop potential interventions or treatments for various disorders.

ENDURE Trainee Career Goals and Plan:

I plan to pursue an MD/PhD in neuroscience in with an emphasis on working with children so that I can develop a career in pediatric psychiatry.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Alex Johnson, PhD, and Janelle V. LeMon**

ENDURE Research Project Title**: Identification of Iso-Preferred Reinforcers for Use in an Instrumental Reward Devaluation Task**

The rat model of binge eating is utilized because of its ability to identify the binge eating phenotype through intermittent access to highly palatable food. Within the rat model of binge eating, there are three phenotypes that makeup a spectrum of BE, including binge eating prone (BEP), binge eating neutral (BEN), and binge eating resistant (BER). The instrumental reward devaluation teat (IRDT) which is a test of impulsive choice and habit was the focus of our behavioral research. Some performance on the IRDT showed a statistically insignificant preference for one palatable reward over the other. It was necessary to find an iso-preferred palatable reward combination that would diminish this slight preference to there being no observed preference between the two rewards. To accomplish this goal we used the two-bottle Choice Test and the one-bottle Acceptance Test to measure rats' consumption. After analyzing rats' consumption of their assigned reinforcer pairs for both tests by way of dependent sample t-tests, we found the consumption of the reinforcer pair of 20% sucrose with orange kool-aid and 20% sucrose with lime kool-aid to be statistically insignificant across both tests. These results indicate this reinforcer pair as being iso-preferred.

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Undergraduate Major and Expected Graduation Date: **Psychology, May 2018**
Mentors/Advisors at Home Institution: **Lisa de la Mothe, PhD, and Hugh Fentress, PhD**

ENDURE Trainee Scientific Interest:

Scientific research that interests me is anything dealing with brain disorders. The ENDURE program supported my interest during research I conducted this past summer. I had the privilege of conducting research on the gene Foxp2 as it relates to the function of cortical development.

ENDURE Trainee Career Goals and Plan:

Upon graduation from college, I plan on attending a graduate that offers a PhD program. From there I will go on to earn my doctoral degree and began a career in neuropsychology. The ENDURE program has already supported the start of these plans with the TSU-NERVE program. It has introduced me to the field of neuroscience, which from there I researched and found neuropsychology which again is my career goal.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution**: University of Southern California**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Pat Levitt, PhD**

ENDURE Research Project Title**: Expression of Foxp2 in corticothalamic neurons effect on cortical development**

Early studies identified mutations in Foxp2 that were associated with individuals who had developmental speech and language disorders. Human clinical studies suggest that Foxp2 is involved in the development of brain structures that are important for the ability to produce effective language, raising new questions about what role Foxp2 might play on the developing brain, Foxp2 is a DNA binding protein transcription factor, which has been implicated in the development of many structures in the human brain. To examine the role of Foxp2 we first sought to define the specific cortical neuron subtypes that express Foxp2 during development through a combination of retrograde tracing to identify neurons in the cerebral cortex that project to different targets, and immunohistochemistry to localize proteins that are well known markers of specific types of cortical neurons. We found, that Foxp2 was expressed more in corticothalamic neurons rather than corticocortical neurons. If Foxp2 is playing a role in cortical development, it should impact the corticothalamic neurons more. We used conditional Foxp2 knockout mice where we genetically deleted Foxp2 from the cerebral cortex. Using confocal microscopic imaging and cell counting methods, we examine whether Foxp2 alters the number of the specific neurons subtypes.

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 PhD in behavioral neuroscience of 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 develop mental disorders.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Southern California**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Bradley Peterson, MD**

ENDURE Research Project Title: **Less Tissue Organization in White Matter Suggest More Typical Socialization**

In this research study the focus was tissue organization in white matter. Brain images were taken from children who had been exposed to toxins prenatally. The amount of tissue organization was compared to scores on SRS (Social Responsiveness Scale). SRS is a tool used to measure social ability in children from ages 4-18. The scale measures social capacity on a spectrum of being socially impaired to above average. The results show a positive correlation between SRS score and tissue organization, suggesting that for this population the more myelin present, the more deficient in socialization.

ENDURE TRAINEE ABSTRACT

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Mentors/Advisors at Home Institution: **Hugh Fentress, PhD, and Lisa De la Mothe, PhD**

ENDURE Trainee Scientific Interest:

I am interested in understanding more about the neural mechanisms underlying child development and the resulting influence on behavior. I'm particularly interested in examining disorders such as anxiety, depression and other mental disorders.

ENDURE Trainee Career Goals and Plan:

My career goals after my undergraduate degree are to get my PhD in behavioral neuropsychology. After obtaining my PhD I want do research on how the brain develops and affects the behavior of children and adolescents. Eventually I would like to become a child psychologist and open an after-school nonprofit program for children with behavioral issues.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Mark Burns, PhD, and Bevan Main, PhD**

ENDURE Research Project Title: **Behavioral differences in sham mice and mice that have received traumatic brain injury**

Have you ever wondered what happens when football players and boxers get knocked out? Have you ever wondered how the brain was being affected? Or if it was causing traumatic brain injury (TBI)? While working in the lab we induced traumatic brain injury(TBI) in mice resulting in a concussion. The main purpose of the project was to run various behavioral tests, then analyze the data to determine if there was a difference between the mice that received concussions and the mice that did not. We ran several behavioral tests such as the elevated plus maze which test risk taking behavior, the Morris water maze to test cognitive memory, and T maze to test spatial cognitive memory. The only time that the data was significant was during the T maze. Data analysis continues to be performed for these measures. We also ran several behavioral tests on the mice.

ENDURE TRAINEE ABSTRACT

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Mentors/Advisors at Home Institution: **Kelli Duncan, PhD, and Kevin Holloway, PhD**

ENDURE Trainee Scientific Interest:

I am interested in researching psychopharmacological treatments for psychological and neurological disorders, the neurological formation of memory, and the relationship between neural activity and behavior.

ENDURE Trainee Career Goals and Plan:

I aim to earn an MD/PhD degree in neurochemistry and work as a medical scientist researching new treatments for neurodegenerative diseases and addiction.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Daniel Abernathy, PhD; Andrew Yoo, PhD; Diana Jose-Edwards, PhD; and and Erik Herzog, PhD**

ENDURE Research Project Title: **MicroRNA-based reprogramming of human adult fibroblasts into dopaminergic neurons**

Parkinson's disease (PD) is characterized by the deterioration of dopaminergic (DA) neurons of the substantia nigra pars compacta. The ability to generate neurons directly from PD patients will offer powerful research tools to study the pathogenesis of PD intrinsic in patient-derived neurons. One promising source of patient specific DA neurons is those generated through direct neuronal conversion of patient fibroblasts. We have previously shown that ectopically expressing the brain-enriched microRNAs miR-9/9* and miR-124 (miR-9/9*-124) in human fibroblasts allows efficient generation of human neurons that retain the age of fibroblast donors, as measured by age-associated cellular properties such as DNA methylation patterns and telomere length; unlike DA neurons derived from induced pluripotent stem cells (iPSCs). We also have shown that coexpressing miR-9/9*-124 and a discrete set of transcription factors (TFs) leads to subtype-specific neuronal reprogramming of human adult fibroblasts. In this study, we screen TFs enriched in DA neurons with the aim of identifying genes capable of guiding the miR-9/9*-124-based conversion to DA neurons. Our results serve as the first step towards optimizing this method, which we aim to use as a source of neurons for *in vitro* PD modeling.

COMPLETE ENDURE STUDENT ACTIVITIES AT SFN: November 10-15, 2017

FRIDAY Nov 10	4:00 – 7:00pm Building an ENDURing Network **BP-ENDURE Student Kick-Off Event** **Georgetown School of Continuing Studies** **640 Massachusetts Ave NW, Washington DC, 20001** **3:30 – 4:00pm Arrival** *everyone needs an ID to enter the building* **4:00 – 4:30pm Light Appetizers and Refreshments, Name Badge Icebreaker** **4:30 – 4:40pm Opening remarks** **4:40 – 5:10pm Welcome and Introduction to GU** **5:00 – 5:10pm The Week Ahead: Getting the Most Out of SfN** **5:10 – 5:35pm GU Graduate Students** **5:35 – 5:50pm Elevator Speech Preparation** **5:50 – 6:50pm ENDURE Neuroscience Trivia and "Shark Tank"** **6:50 – 7:00pm Closing Remarks and Final Building of New Connections**
SATURDAY Nov 11	7:00 – 11:30 am **7TH ANNUAL NIH BLUEPRINT ENDURE MEETING** Renaissance Washington DC Downtown Hotel, Renaissance Ballroom E **(999 9th St NW, Washington DC, 20001)** **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: Convention Center Hall E **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: Convention Center Hall E 7:30 – 9:30pm **CAREER DEVELOPMENT TOPICS: A NETWORKING EVENT** Location: Convention Center Hall E **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 10-15, 2017

SUNDAY **Nov 12**	MORNING AND AFTERNOON Attend Scientific Program • Featured lectures • Symposia • Special lectures • Minisymposia Plan Your Itinerary for Neuroscience 2017 12:00 – 2:00pm GRADUATE SCHOOL FAIR Location: Convention Center Hall E Meet face-to-face with student advisors, program faculty, and graduate school representatives at the third annual Graduate School Fair.
MONDAY **Nov 13**	MORNING AND AFTERNOON Attend Scientific Program • Featured lectures • Symposia • Special lectures • Minisymposia Plan Your Itinerary for Neuroscience 2017 12:00 – 2:00pm GRADUATE SCHOOL FAIR Location: Convention Center Hall E 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: Independence FGH
TUESDAY **Nov 14**	MORNING AND AFTERNOON Attend Scientific Program • Featured lectures • Symposia • Special lectures • Minisymposia Plan Your Itinerary for Neuroscience 2017 12:00 – 2:00pm GRADUATE SCHOOL FAIR Location: Convention Center Hall E Meet face-to-face with student advisors, program faculty, and graduate school representatives at the third annual Graduate School Fair.

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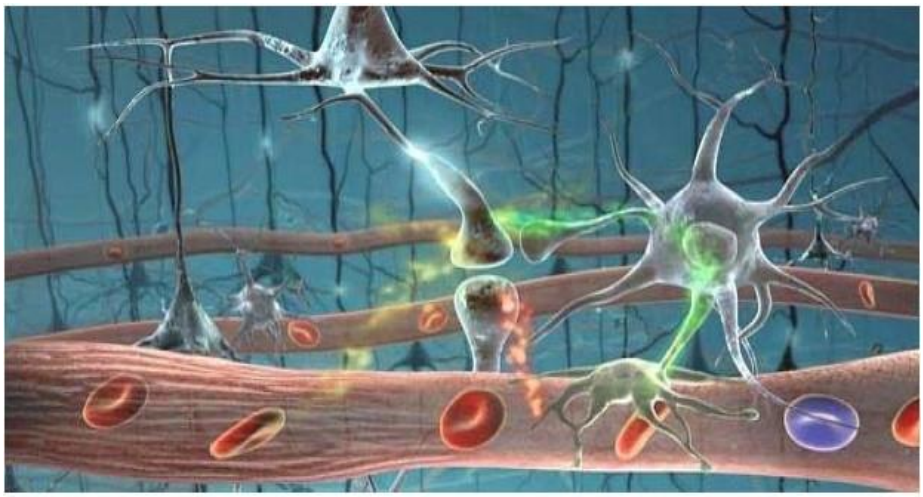

THANK YOU FOR YOUR PARTICIPATION