NIH **Blueprint** for Neuroscience Research

4th Annual NIH Blueprint

Enhancing Neuroscience Diversity through Undergraduate Research Education Experiences (ENDURE)

2014 Program Meeting

November 15, 2014

Washington, DC

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

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

National Institutes of Health
Turning Discovery Into Health

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ENDURE PROGRAM GOALS

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

MEETING GOALS

As issued, the RFA (http://grants.nih.gov/grants/guide/rfa-files/RFA-MH-10-070.html) 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)

Dr. Mark Chavez (NIH)

Ms. TaRaena Yates (*Synergy Enterprises, Inc.)*

Ms. Tyauna Brown (*Synergy Enterprises, Inc.)*

Ms. Lynn Rundhaugen (NIH)

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

ENHANCING NEUROSCIENCE DIVERSITY THROUGH UNDERGRADUATE RESEARCH EDUCATION EXPERIENCES (ENDURE) 4TH ANNUAL MEETING
MARRIOTT MARQUIS, INDEPENDENCE BALLROOM EFGH
NOVEMBER 15, 2014

7:00 – 7:30 AM **REGISTRATION**

7:30 – 7:40 AM **ENDURE MEETING GOALS AND INTRODUCTION**

DR. MARK CHAVEZ, DIVISION OF ADULT TRANSLATIONAL RESEARCH AND TREATMENT DEVELOPMENT, NATIONAL INSTITUTE OF MENTAL HEALTH (NIMH)

7:40 – 8:10 AM **NIH BLUEPRINT WELCOME AND SCIENTIFIC PRESENTATION**

DR. GEORGE KOOB, NATIONAL INSTITUTE OF ALCOHOL ABUSE AND ALCOHOLISM (NIAAA), INSTITUTE DIRECTOR - *Q&A*

8:10 – 9:30 AM **PANEL ON "PATHWAYS AND PERSPECTIVES ON BEING A RESEARCHER"**

CHAIR AND PANEL INTRODUCTIONS: DR. MICHELLE JONES-LONDON, OFFICE OF TRAINING, CAREER DEVELOPMENT AND WORKFORCE DIVERSITY, NATIONAL INSTITUTE OF NEUROLOGICAL DISORDERS AND STROKE (NINDS)

A DISCUSSION FRAMED BY SEVERAL SPECIFIC QUESTIONS: WHAT SHOULD A GRADUATE STUDENT EXPECT BOTH OF THE SCHOOL AND THEMSELVES? HOW DO I IDENTIFY A GOOD MENTOR? WHY IS A CAREER IN NEUROSCIENCE RESEARCH 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 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. CAROLYN RODRIGUEZ – COLUMBIA UNIVERSITY, DEPARTMENT OF PSYCHIATRY, DIRECTOR, HOARDING DISORDER RESEARCH PROGRAM
- DR. COREY HARWELL – HARVARD MEDICAL SCHOOL, DEPARTMENT OF NEUROBIOLOGY, ASSISTANT PROFESSOR OF NEUROBIOLOGY
- MR. STEVE RAMIREZ – MIT, DEPARTMENT OF BRAIN AND COGNITIVE SCIENCES, PH.D. CANDIDATE

9:30 – 11:00 AM **CONCURRENT NETWORKING SESSIONS**

(A) **T32 RECRUITMENT FAIR AND NETWORKING** – INSTITUTIONS WITH A STRONG RECORD OF NEUROSCIENCE TRAINING AND INTERESTED IN RECRUITING FOR PREDOCTORAL RESEARCH PROGRAMS

(B) **ENDURE ALUMNI NETWORKING ROOM** - A PRESENTATION OF NIH FUNDING OPPORTUNITIES FOLLOWED BY ROUND TABLE DISCUSSIONS OF VARIOUS RESEARCH AND PROFESSIONAL DEVELOPMENT TOPICS

PRESENTERS AND MODERATORS: DR. ALBERT AVILA, NATIONAL INSTITUTE ON DRUG ABUSE (NIDA); DR. JANET L. CYR, NATIONAL INSTITUTE ON DEAFNESS AND OTHER COMMUNICATION DISORDERS (NIDCD); DR. ALBERTO RIVERA-RENTAS, NATIONAL CENTER FOR COMPLEMENTARY AND ALTERNATIVE MEDICINE (NCCAM)

BIOGRAPHICAL SKETCHES

George Koob, Ph.D.
Director, National Institute on Alcohol Abuse and Alcoholism
National Institutes of Health

Dr. George Koob, an internationally-recognized expert on alcohol and stress, and the neurobiology of alcohol and drug addiction, began his tenure as Director of the National Institute on Alcohol Abuse and Alcoholism (NIAAA) on January 27, 2014. As NIAAA Director, Dr. Koob oversees a wide range of alcohol-related research, including genetics, neuroscience, epidemiology, prevention, and treatment.

Even before beginning as NIAAA Director, Dr. Koob had a longstanding relationship with the Institute. Throughout his career, he received funding from NIAAA and other NIH institutes for many significant research projects. Importantly, he also led a 10-year, NIAAA-funded, multi-institutional consortium dedicated to identifying the molecular basis of alcoholism.

Dr. Koob received his Ph.D. in Behavioral Physiology from Johns Hopkins University in 1972. He spent most of his career at the Scripps Research Institute, where he served as the Director of the Alcohol Research Center, and as Professor and Chair of the Scripps' Committee on the Neurobiology of Addictive Disorders. Early in his career, he served as a researcher in the Department of Neurophysiology at the Walter Reed Army Institute of Research and in the Arthur Vining Davis Center for Behavioral Neurobiology at the Salk Institute for Biological Studies. He was a post-doctoral fellow in the Department of Experimental Psychology at the University of Cambridge.

Dr. Koob began his career studying the neurobiology of emotion, including how the brain processes reward and stress. His contributions advanced our understanding of the anatomical connections of emotional systems and the neurochemistry of emotional function. This background led to investigations into why certain alcohol drinkers transition to addiction while others do not, and how the brain and body respond to alcohol consumption.

Dr. Koob's work has significantly broadened our understanding of the neurocircuity associated with the acute reinforcing effects of alcohol and other drugs of abuse, and of the neuroadaptations of the reward and stress neurocircuits that lead to addiction. In addition, he has validated key animal models for addiction associated with alcohol and drugs and identified the major role that brain stress systems play in the development of addiction. Dr. Koob is the author of more than 600 peer-reviewed scientific papers, and the co-author of *The Neurobiology of Addiction*, a comprehensive review of the most critical neurobiology of addiction research conducted over the past 50 years.

Dr. Koob is the recipient of many prestigious honors and awards, including the Daniel Efron Award for excellence in research and Axelrod Mentorship Award from the American College of Neuropsychopharmacology, the Distinguished Investigator and Marlatt Mentorship Awards from the Research Society on Alcoholism, and the Mark Keller Award from NIAAA.

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.

Carolyn Rodriguez, M.D., Ph.D.
Director, Hoarding Disorder Research Program
Department of Psychiatry
Columbia University

Carolyn I. Rodriguez, M.D., Ph.D. is the Medical Director of Translational Therapeutics, Director of the Hoarding Disorders Research Program, and the Florence Irving Assistant Professor at Columbia University Department of Psychiatry and New York State Psychiatric Institute. Dr. Rodriguez's research program focuses on developing novel treatments for individuals with Obsessive-Compulsive Disorder (OCD) and hoarding disorder.

Dr. Rodriguez's work has been funded by the National Institutes of Mental Health, New York State Office of Mental Health, Harold Amos Medical Faculty Development Program, Columbia Provost's Office, Irving Clinical Scholars Program, Empire Clinical Scholars Program, Gray Matters at Columbia, BBR/NARSAD Foundation and private donations from the Molberger Scholar and Pisetsky awards.

After graduating from Harvard University, Dr. Rodriguez completed the M.D.-Ph.D. program at Harvard Medical School. Dr. Rodriguez completed her internship, residency, and postdoctoral fellowship in psychiatry at the Columbia-Presbyterian Medical Center.

Corey Harwell, Ph.D.
Assistant Professor of Neurobiology
Department of Neurobiology
Harvard Medical School

Corey Harwell is an Assistant Professor in the Department of Neurobiology at Harvard Medical School. Corey received his undergraduate degree in Chemistry from Tennessee State University, and became introduced to neuroscience through participation in summer research programs at UCSF and MIT. He went on to receive his Ph.D. in neurobiology from MIT, where he studied the role of the secreted factor CPG15 in the development of the cortex. Corey did his postdoctoral training at UCSF and has been an Assistant Professor at HMS since 2013. His current research is focused on understanding cellular and molecular mechanisms that regulate synaptic specificity during cortical circuit development.

Steve Ramirez
Graduate Student
Massachusetts Institute of Technology

Steve is a graduate student at MIT's Brain and Cognitive Sciences department pursuing a Ph.D. in neuroscience. His work focuses on finding where single memories are located throughout the brain, genetically tricking the brain cells that house these memories to respond to brief pulses of light, and then using these same flickers of light to reactivate, erase, and create memories. The goals of his research are twofold: to figure out how the brain gives rise to the seemingly ephemeral process of memory, and to predict what happens when specific brain pieces breakdown to impair cognition. His work has been published in *Science* and *Nature.*

Ramirez aims to be a professor who runs a lab that plucks questions from the tree of science fiction to ground them in experimental reality. He believes that a team-oriented approach to science makes research and teaching far more exciting. When he's not tinkering with memories in the lab, Ramirez also enjoys running and cheering on every sports team in the city of Boston.

T32 RECRUITMENT FAIR PARTICIPANTS

University/School	Representative
BROWN UNIVERSITY	**Anne C. Hart, PhD** Professor of Biology **Diane Lipscombe, PhD** Professor of Neuroscience **David Sheinberg, PhD** Professor of Neuroscience
GEORGETOWN UNIVERSITY	**Patrick Forcelli, PhD** Instructor in Pharmacology **Ludise Malkova, PhD** Associate Professor **Edith Brignoni-Pérez** Graduate Student **Valerie Darcey, MS, RD** Graduate Student
HARVARD MEDICAL SCHOOL	**Rosalind Segal, MD, PhD** Professor of Neurobiology
JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE	**Dwight Bergles, PhD** Professor of Neuroscience and Otolaryngology-Head and Neck Surgery **Gul Dolen, MD, PhD** Assistant Professor of Neuroscience Director of Minority Affairs
MICHIGAN STATE UNIVERSITY	**Jim Galligan, PhD** Neuroscience Program Director Professor, Pharmacology and Toxicology
NEW YORK UNIVERSITY	**Chiye Aoki, PhD** Professor of Neural Science and Biology **Annette 'Nina' Gray, PhD** Administrative Director **Lynne Kiorpes, PhD** Professor of Neural Science and Psychology **Bernardo Rudy, MD, PhD** Professor, Department of Neuroscience and Physiology
NORTHWESTERN UNIVERSITY FEINBERG SCHOOL OF MEDICINE	**Julius Dewald, PhD** Professor, Chair Department of Physical Therapy and Movement Sciences
OHIO STATE UNIVERSITY COLLEGE OF MEDICINE	**Denis Guttridge, PhD** Professor Director, Center for Muscle Health and Neuromuscular Disorders
OREGON HEALTH & SCIENCE UNIVERSITY	**Gary Westbrook, MD** Senior Scientist and Co-Director, Vollum Institute Director, Neuroscience Graduate Program
PRINCETON UNIVERSITY	**Ken Norman, PhD** Professor of Psychology
TEMPLE UNIVERSITY	**Ellen Unterwald, PhD** Professor of Pharmacology Director, Center for Substance Abuse Research
UNIVERSITY OF CALIFORNIA DAVIS	**Cameron S. Carter, MD** Professor of Psychiatry and Psychology

University/School	Representative
UNIVERSITY OF CALIFORNIA LOS ANGELES	**Dwayne Simmons, PhD** Director, MARC and Bridges Undergraduate Research Programs Director, Brain Research Institute, Diversity for Neuroscience Education and Outreach
UNIVERSITY OF CALIFORNIA SAN DIEGO	**Timothy Gentner, PhD** Professor, Department of Psychology **Stefan Leutgeb, PhD** Associate Professor, Division of Biological Sciences, Neurobiology Section **Bradley Voytek, PhD** Assistant Professor, Department of Cognitive Science **Jeff Dahlen** Graduate Student **Vladimir Jovanovic** Graduate Student **Samantha Scudder** Graduate Student
UNIVERSITY OF COLORADO DENVER	**Diego Restrepo, PhD** Professor, Cell and Developmental Biology Director, Center for NeuroScience (CNS) **Sukumar Vijayaraghavan, PhD** Professor Director of Neuroscience Graduate Program
UNIVERSITY OF MARYLAND	**Jessica A. Mong, PhD** Associate Professor Department of Pharmacology Director of Graduate Education, Program in Neuroscience **Renee Cockerham, PhD** Postdoctoral Fellow
UNIVERSITY OF MICHIGAN	**Audrey Seasholtz, PhD** Professor, Biological Chemistry **Edward Stuenkel, PhD** Professor, Molecular & Integrative Physiology Director, Neuroscience Graduate Program
UNIVERSITY OF NORTH CAROLINA CHAPEL HILL	**Aldo Rustioni, MD** Professor, Joint Appointment in Cell and Developmental Biology
UNIVERSITY OF PENNSYLVANIA	**Irwin Lucki, PhD** Professor of Psychology in Psychiatry
UNIVERSITY OF ROCHESTER MEDICAL CENTER	**Ania Majewska, PhD** Associate Professor**,** Department of Neurobiology and Anatomy **Douglas Portman, PhD** Associate Professor**,** Department of Biomedical Genetics, Center for Neural Development & Disease
UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT SAN ANTONIO	**David Morilak, PhD** Director, Neuroscience Graduate Program Director, Center for Biomedical Neuroscience
UNIVERSITY OF UTAH	**Richard Dorsky, PhD** Professor of Neurobiology and Anatomy

University/School	Representative
VANDERBILT UNIVERSITY	**Mark Wallace, PhD** Director, Vanderbilt Brain Institute Director, Neuroscience Graduate Program
WAKE FOREST UNIVERSITY	**Christos Constantinidis, PhD** Professor, Department of Neurobiology & Anatomy Admissions Committee Chair **Carol Milligan, PhD** Professor, Department of Neurobiology & Anatomy Neuroscience Graduate Program Director
YALE SCHOOL OF MEDICINE	**Michael Crair, PhD** William Ziegler III Professor of Neurobiology and Professor of Ophthalmology and Visual Science Director, Graduate Studies **Amanda Hernandez** Graduate Student

MENTORING RESOURCES AND PROFESSIONAL CONFERENCES

"MENTOR: SOMEONE WHOSE HINDSIGHT CAN BECOME YOUR FORESIGHT"

Society for Neuroscience Mentoring Program
http://www.sfn.org/careers-and-training/neurojobs-career-center/mentoring-program

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

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

BP-ENDURE-ATLANTA: ENGAGING UNDERGRADUATES IN NEUROSCIENCE RESEARCH

GEORGIA STATE UNIVERSITY
Principal Investigator: *Dr. Kyle J. Frantz*
Partner Institutions: Emory University, Agnes Scott College and Spelman College

PROGRAM DESCRIPTION: The BP- ENDURE-Atlanta project led by Georgia State University (GSU) along with member institutions Agnes Scott College, Emory University, and Spelman College, will provide a two-year neuroscience research immersion and integration program for students from underrepresented groups.

We aim to engage outstanding undergraduates in research and training, using a two-year program for junior and senior undergraduates that includes five major components:

1) a research immersion in Atlanta's well-established BRAIN summer program; 2) a Research Assistantship in the first academic year; 3) a Travel Assistantship to conduct research at one of 15 partner T32 training programs in the second summer; 4) a Capstone Research Assistantship during the second academic year; and 5) an intensive professional development workshop series. Key program events include a poster session at the end of the BRAIN summer program, slide presentations at our annual Spring Symposium, and attendance at the international Society for Neuroscience meeting for first-year participants.

Program evaluation will record participant views on all program elements (formative evaluation), as well as potential progress in communication skills, confidence with research abilities, and pathways toward successful careers. Mentors are requested to evaluate student progress in research skills using a newly developed instrument. Outcomes data will help to fill a gap in current knowledge about how best to encourage and prepare students to help address biomedical, behavioral, and clinical research needs, with a focus on students from underrepresented groups.

ADDITIONAL PROGRAM TEAM MEMBERS:

Ms. Emily Hardy - Program Coordinator - Georgia State University
Dr. Chris Goode - Georgia State University
Dr. Yoland Smith - Emory University
Dr. Karen Brakke - Spelman College
Dr. Jennifer Larimore - Agnes Scott College

ENDURE TRAINEE ABSTRACT

ASHLEY EALEY

Home Institution and State: **Agnes Scott College, Georgia**
Email: aealey@agnesscott.edu
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Neuroscience, May 2016**
Mentors/Advisors at Home Institution: **Jennifer Larimore, Ph.D., and Tamara Caspary, Ph.D. at Emory University**

ENDURE Trainee Scientific Interest:

I am interested in cognitive neurodevelopment in children with neurological diseases and learning disabilities. I hope to study Educational Neuroscience in the future, focusing on the concept of learning. My interest in cognitive neurodevelopment branches into the fields of genetics, developmental biology and neuroscience, which I find both interesting and completely crucial and connected for normal social and neurological development.

ENDURE Trainee Career Goals and Plan:

I hope to be in a career in which I will be able to be an educator and share scientific research. I hope to be the bridge between scientists and teachers as well as both scientists and teachers and policy makers. In order to accomplish this goal I plan to obtain a graduate level degree in Educational Neuroscience or Cognitive Neuroscience as well as a Masters in Teaching. I also hope to teach for at least a year in a primary school setting after graduating from Agnes Scott College in order to get further understanding of the concept of learning within the context of early neurodevelopment.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Tamara Caspary, Ph.D., and Sarah Bay**

ENDURE Research Project Title: **Arl13b Deletions Effect on Postnatal Cerebellar Development**

Our lab studies Arl13b, a small GTPase that is found in the primary cilium of cells and regulates Sonic hedgehog (Shh) signaling. Shh signaling is dependent on primary cilia. The primary cilia and appropriate Shh signaling are important for development of the cerebellum because they direct proliferation of granule neuron precursor cells. Mutations in Arl13b are linked to human disorders

such as Joubert Syndrome as well as medulloblastomas, tumors created by overactive Shh signaling during cerebellar development. At prenatal stages of development, Arl13b is essential for normal cerebellar morphology. Deletion of Arl13b early in development alters Shh signaling compromising cerebellar morphogenesis, resulting in a small or absent cerebellum. We hypothesized that Arl13b could also play a role in postnatal cerebellar development. We deleted Arl13b in four day old mice in the granule neuron precursor cells. We compared brain tissue from control and experimental animals and looked for expression of Arl13b in the external granular layer and gross morphology. Our findings allow us to conclude that deletion of Arl13b at P4 does not appear to have a gross impact on postnatal cerebellar development.

ENDURE TRAINEE ABSTRACT

ALANAH GRISHAM

Home Institution and State: **Spelman College, Georgia**
Email**: agrisha1@scmail.spelman.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Psychology Pre-Medicine, May 2016**
Mentors/Advisors at Home Institution: **Karen Brakke, Ph.D**.

ENDURE Trainee Scientific Interest:

My scientific research interest is looking at cellular activity and conducting experiments with mice and/or rats. I am fascinated by behavioral research because you can see its direct impact on human subjects. I am very interested in the bridge between psychiatry and neuroscience, therefore, all my interests stem from that connection.

ENDURE Trainee Career Goals and Plan:

My career goal is to graduate from Spelman College and go on to attain an MD/PhD. My focus is on psychiatry and neuroscience in relation to PTSD or severe Mental Disorders of the criminally insane. My goal is to research PTSD and schizophrenia and how it relates to violent crimes.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Yue Feng, Ph.D., and Megan Allen**

ENDURE Research Project Title: **Mutagenesis of the G-Quadruplex in the BDNF 3' UTR Reduces BDNF Reporter Expression**

Brain Derived Neurotrophic Factor (BDNF) is a secretory protein in the brain that plays multiple roles in normal brain function as well as in multiple neurological diseases. Alternative polyadenylation of the BDNF transcripts results in two types of BDNF mRNA: containing either a short or a long 3' untranslated region (UTR). Sequence analysis identified a guanine rich element, which is located close to the proximal polyadenylation site in the BDNF transcript that can form a G-Quadruplex structure. It is known from examples in cancer research, that G-Quadruplex structures in DNA can affect transcription. We hypothesize that the G-Quadruplex in the BDNF 3'UTR regulates BDNF expression. In this summer research program, we explored the function of the G-Quadruplex using a luciferase reporter that contained the BDNF long 3' UTR. We discovered the first evidence that the G-Quadruplex plays an important role in BDNF expression.

ENDURE TRAINEE ABSTRACT

BRIANNA HARRIS

Home Institution and State: **Spelman College, Georgia**
Email: **bharri24@scmail.spelman.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Physics, May 2016**
Mentors/Advisors at Home Institution: **Karen Brakke, Ph.D. and Malu Tansey, Ph.D. at Emory University**

ENDURE Trainee Scientific Interest:

There are many research areas that interest me, but learning and memory are at the top of the list. Learning happens when the brain processes information while memory deals with the retention of information. I want to research the behavioral effects of individuals who experience difficulty with either learning or memory or both, and whether lack of learning ability and/or memory affects an individual's lifespan. Although I would really like to help in the dementia research field, Alzheimer's research is my personal focus.

ENDURE Trainee Career Goals and Plan:

I am currently a junior physics major at Spelman College preparing to apply for medical school next year. My goal is to be either an obstetrician or a neurologist. Both careers hold my interest, so it is a difficult choice. However, no matter which path I choose, I plan to still make time to commit to Alzheimer's and dementia research, and probably be the primary investigator of my own lab one day.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Malu Tansey, Ph.D., and George Kannarkat**

ENDURE Research Project Title: **Microglia Activation and Monocyte Chemotaxis in RGS10-Null Mice**

Neurodegenerative disorders are marked by peripheral immune cell infiltration into the central nervous system (CNS). On entering the diseased CNS, monocytes differentiate into tissue-resident dendritic cells and macrophages which aid in modulating inflammation, producing effector molecules that destroy pathogens, and even help in brain-resident microglial cells. Monocytes are brought to inflammation sites including the CNS through chemokine receptors (CRs). CRs are G-protein linked receptors and are modulated by Regulator G-protein Signaling (RGS) proteins, which

act as GTPase accelerating proteins (GAPs). Previous studies have not identified physiologic substrates for RGS10, a GAP that is highly enriched in immune cells, implicated in regulating activation of microglia, CNS-resident myeloid cells, and linked to age related macular degeneration in humans. The current study proposes to define the role of RGS10 in monocyte responses to chemokine stimulation. Chemotactic responses have been modeled by seeding human umbilical vein endothelial cells (HUVECs) into a microfluidics chamber to measure binding patterns of monocytes from RGS10 wild-type and knockout mice. This study also sought to confirm the microgliosis phenotype found in RGS10 knockout mice on a pure genetic background, the C57/BL6 background. New information obtained in this study could eventually lead to the development of treatments of neurologic diseases.

ENDURE TRAINEE ABSTRACT

ANISHA KALIDINDI

Home Institution and State: **Emory University, Georgia**
Email: **akalidi@emory.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Biology, May 2016**
Mentors/Advisors at Home Institution: **Yolanda Smith, Ph.D. and Gretchen Neigh, Ph.D.**

ENDURE Trainee Scientific Interest:

The time I spent in the lab this summer revealed the possibilities of integrating my interests in both molecular biology and neuroscience. I have chosen to pursue work in the field of neuroscience because it allows me to capture all my interdisciplinary interests among the sciences. I enjoyed seeing overall behavioral phenotypes while being able to also see the related molecular phenotypes. I hope to one-day incorporate genetics, epigenetics specifically, into my work as well to gain an even bigger scope of understanding in the workings of the human body. I have recently been excited with work our lab is doing concerning sex-differences and neuroendocrinology.

ENDURE Trainee Career Goals and Plan:

I plan on spending my next two years in college, taking classes in biology, neuroscience, chemistry, and computer science. While I am planning to major in biology, I want to have an interdisciplinary approach to my science education. Through my experience in the lab and additional classes, I hope to prepare for an application to a Ph.D. program. I plan to apply to molecular biology programs with the hope that I will be able to apply my skills in a neuroscience lab. I hope this will lead to career as a biomedical researcher. I see myself having a career in a vibrant academic environment at either a research-centered university or a non-profit research institute. I would like to integrate my interests in STEM education mentorship as part of my career in academia.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Gretchen Neigh, Ph.D**.

ENDURE Research Project Title: **Region-Specific Influences of Ovarian Hormones on Cerebral Glucocorticoid Receptors**

It is well established that stress responses can be sexually dimorphic. The glucocorticoid receptors (GR), which is present in both the prefrontal cortex and hippocampus, may be influenced by sex steroids. Therefore, understanding more about the mechanism of GR in the female rat may lead to an understanding of the sexually dimorphic nature of the stress response. Two of the co-chaperones which modulate the function of the GR and are influenced by sex steroids are FKBP51 and PPID but much of what is known with their interactions are from cancer cell lines. We hypothesized that GR and its co-chaperones would be significantly influenced by ovarian hormones. In order to test this hypothesis we compared ovariectomized females to sham-operated females. The target genes, GR and its co -chaperones (PPID and FKBP1) were quantified through quantitative RT-PCR. Removal of ovarian hormones caused a significant reduction in gene expression in the hippocampus but did not impact expression in the prefrontal cortex. These data demonstrate that sex steroids impact GR and its co-chaperones in a region-specific manner, suggesting that the hippocampus is a mediator for sex dependent stress response. For further study more molecular analysis to elucidate the mechanism of GR will be done.

ENDURE TRAINEE ABSTRACT

ARIELLE LEWIS

Home Institution and State: **Emory University, Georgia**
Email: **aflewi2@emory.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Neuroscience and Behavioral Biology, May 2016**
Mentors/Advisors at Home Institution: **Yoland Smith, Ph.D. and Victor Faundez, M.D., Ph.D.**

ENDURE Trainee Scientific Interest:

I was introduced to neuroscience via Neurodevelopmental Disorders (NDDs) such as Schizophrenia and their affects at the cellular and molecular level. In order to understand the subcellular mechanisms of the disease, absence of Biogenesis of Lysosome Related Organelles complex-1 (BLOC-1) protein dsybindin were explored by inducing the absence of BLOC-1 proteins in mammalian cells. Since endosomal trafficking and synaptic vesicle morphology is altered with decreased levels of BLOC-1, it is important to explore mRNA translation and synaptic plasticity that may be altered by cells that work with the BLOC-1 complex. By understanding at the cellular level, this may help explain the phenotypes present in Schizophrenia.

ENDURE Trainee Career Goals and Plan:

After I receive my bachelor's degree from Emory University, I hope to attend medical school and/or graduate school to obtain a combined MD/PhD or individual doctorate degrees. My focus at present is on the biological components of neurodevelopmental disorders. Ideally, I would like to work in an academic institution as a physician-scientist. I believe having the ability to serve as a physician and a scientist will provide a thoughtful way to explore and treat complex mental diseases. Ultimately, and if I'm lucky, I want to run my own lab, be a professor, teach trainees and students, and serve as a role model for them. Among the clinically relevant specialties I am considering are included psychiatry, neurology, and genetics; however, I am open to exploring other areas.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Victor Faundez, M.D., Ph.D., Stephanie Zlatic, Ph.D., and Amelia Burch**

ENDURE Research Project Title: **Upregulation of Ataxin-2 in BLOC-1 Deficient Cells**

Biogenesis of Lysosome-related Organelles Complex -1 (BLOC-1) is composed of eight protein subunits involved in endocytosis. BLOC-1 is required for targeting specific proteins to synaptic vesicles and lysosome-related organelles from endosomes. One subunit, Dysbindin (dystrobrevin-binding-1), is encoded by the DTNBP1 gene, which is a gene associated with susceptibility to schizophrenia. The function of dysbindin and BLOC-1 remains to be elucidated. The precise molecular pathways at the synapse downstream of BLOC-1 and dysbindin responsible for these changes are the focus of my studies. I determined the cellular levels of these proteins in BLOC-1 deficient Pallidin knockdown SH-SY5Y cells. ATXN2, which causes Spinocerebellar Ataxia-2 (SCA2) in humans, plays a role in mRNA translation and synaptic plasticity. My data show that VAMP7 abundance decreases and reciprocally ATXN2 abundance increases in BLOC-1 deficient SH-SY5Y cells. Data here suggest the possibility that ATXN2 functionally interact with BLOC-1 subunit proteins and may affect RNA metabolism associated with endosomes, and synaptic vesicle function.

ENDURE TRAINEE ABSTRACT

RANRAN LI

Home Institution and State: **Agnes Scott College, Georgia**
Email: **rli@agnesscott.edu**
Undergraduate Academic Level: Junior
Undergraduate Major and Expected Graduation Date: **Mathematics, May 2016**
Mentors/Advisors at Home Institution: **Jennifer Larimore, Ph.D. and Ronald Calabrese, Ph.D. at Emory University**

ENDURE Trainee Scientific Interest:

To me the most stimulating areas of research lie within neuroscience, particularly those that seek to understand the biological brain's manifold operations using computational models and artificial neural networks. The area I've been working in involves using computing algorithms that actually learn and evolve over time to identify ever more meaningful correlations in biological processes -- such as the ion channel bursting activity of leeches. This amazing modelling process truly fascinates me. I am also very interested in the field of neuromorphic engineering, especially as it pertains to brain modeling and understanding other biological processes.

ENDURE Trainee Career Goals and Plan:

PhD in Neuroscience or computational biology. The experience I've gained thus far in the NET/work program has definitely encouraged me to pursue computational biology as a career. I hope to continue to perform graduate research that employs algorithmic models, and to study artificial neural networks, both digital and analog. Vocationally, I am particularly eager to become involved in research that leverages emerging technologies such as neuromorphic chips that may enable far more accurate and efficient modeling of the brain.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Ronald Calabrese, Ph.D. and Anca Mihu-Doloc, Ph.D.**

ENDURE Research Project Title: **On How Parameter Variations Influence Bursting Activity**

In order to further understand the non-linear relationships between parameters for HCO instances, we picked specific subgroups of data from the HCOs. The first set is a subgroup from the realistic HCO group, and includes all the 8 members of the gh families of the realistic HCO group. The

second set is a subgroup from the unbalanced HCO group, and includes those instances, which become tonically spiking isolated neurons when there is no synapse present between the two neurons. We applied the Principal Component Analysis (PCA) method to both sets. PCA did not identify any linear correlation between parameters in these two subgroups. However, visualizations of these two subgroups in a reduced space suggested that there might be non-linear correlations between some parameters. In light of the sensitivity of period to the changes in current revealed by recent study, we visualized the relations of all the parameters with each characteristic (period, spiking frequency and duty cycle) in both subgroups. We found that for the first set, spiking frequency shows sensitivity to the changes in each gP, gLeak, and gCaS current. Visualization also verified the sensitivity of period to the changes in gh current.

ENDURE TRAINEE ABSTRACT

KHALLYL OLIVER

Home Institution and State: **Georgia State University, Georgia**
Email: **koliver16@student.gsu.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Neuroscience, May 2016**
Mentors/Advisors at Home Institution: **Chris Goode, Ph.D., Elliott Albers, Ph.D., and James Walton, Ph.D.**

ENDURE Trainee Scientific Interest:

My scientific interests include: Sexual Dimorphisms in Syrian Hamsters, Circadian Research (suprachiasmatic nucleus, the entrainment process, and the results of entrainment under different zeitgebers), the GABAA subunits delta and gamma-2, pineal melatonin and its relation to GABAA delta (as both are down regulated during an individual's subjective day), Social Behavior with a specific focus on the Basolateral Amygdala and Ventromedial Hypothalamus, and Hypocretin's effects on cataplexy and social behavior.

ENDURE Trainee Career Goals and Plan:

My short term career goals include: graduating from Georgia State University with a Bachelor's of Science in Neuroscience, and attending graduate school. My primary long term goal is to become a tenured professor and researcher, and the means to accomplish this goal will become more readily accessible after graduating from graduate school (Georgia State University, Ohio State University, or Emory University).

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Elliott Albers, Ph.D., and James Walton, Ph.D**

ENDURE Research Project Title: **Temporal Pattern of GABAA Receptor Delta and Gamma-2 Subunit Expression in the Suprachiasmatic Nucleus of Male Syrian Hamsters**

The suprachiasmatic nucleus (SCN) is the region of the hypothalamus, situated just above the optic chiasm, responsible for controlling the circadian rhythms of the body. It is widely known that gamma-amino butyric acid (GABA) modulates SCN activities, while the SCN mediates circadian rhythms via entrainment. GABAA delta and GABAA gamma-2 subunits co-regulate each other in the

SCN. We hypothesize that the extrasynaptic GABAA delta receptor is more abundant during the dark phase as opposed to GABAA gamma-2, which should be active in light, based on the knowledge that GABAA delta is more sensitive than GABAA gamma-2 and is able to down regulate gamma-2. Adult male Syrian hamsters were ordered from Charles Rivers Laboratories. Hamsters were singly-housed and entrained to a 14:10 light/dark (L: D) cycle over a course of 2-4 weeks. For constant dark (D: D) conditions, hamsters were singly-housed and held in a 14:10 light cycle for two weeks, then placed in a constant dark setting for 9-14 days. Hamsters were also placed in constant light conditions (L: L) for 9-14 days as well. Activity was measured via wheel running. Hamster suprachiasmatic nuclei were collected via micropunch. RNA was extracted with Trizol, reversed transcribed into cDNA library, then expression of GABAA delta and gamma-2 was assessed using a gene specific primer for RT-PCR. Relative gene expression levels for each gene of interest were normalized to 18s expression. Relative mRNA results showed opposite of hypothesis, with GABAA gamma-2 being more readily expressed in light hours and GABAA delta being more expressed in dark hours.

ENDURE TRAINEE ABSTRACT

CAMILLE PHAM-LAKE

Home Institution and State: **Agnes Scott College, Georgia**
Email: **cphamlake@agnesscott.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Neuroscience, May 2016**
Mentors/Advisors at Home Institution: **Jennifer Larimore, Ph.D., and William Michael Caudle, Ph.D. (Emory University)**

ENDURE Trainee Scientific Interest:

During my undergraduate research in neurotoxicology, I have been studying the effects of Polychlorinated biphenyls (PCBs) on the dopamineric system located in the substantia nigra. The more time I spend researching toxicology the more I am drawn to its subtleties, the small changes in the brain's neuroplasticity that can cause great consequence. My undergraduate research although not directly connected with the graduate research I hope to pursue, on Post Traumatic Stress Disorder, will find a commonality in its effect on neuroplasticity that has inspired my great passion for research.

ENDURE Trainee Career Goals and Plan:

Following graduation from Agnes Scott College I hope to further my studies in the field of neuroscience. Presently I plan on participating in an MD/PhD program. As I am particularly interested in Post-Traumatic Stress Disorder, an MD/PhD would allow me to not only be involved in the clinical treatment of the disease but also in the newest developments in research.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **William Michael Caudle, Ph.D.**

ENDURE Research Project Title: **Experimental Techniques to Evaluate the Neurotoxicity of Environmental Chemicals**

There are over 80,000 chemical contaminants in the environment, most in the form of pesticides and industrial solvents. Many are known to contribute to the development of neurological diseases. Research is essential for understanding their relationship to disease and the neural functions they disrupt. This study focused on polychlorinated biphenyls (PCBs). Due to their

physiochemical characteristics they persist in the environment and are significant contributors to deficits in both cognitive and motor functions. Exposure to PCBs has a high correlation with damage to the dopamine system and incidences of Parkinson's disease. Given the conformational diversity of the PCB's this investigation was structured to further explore their differing neurotoxicity's through toxicity assays on both the SK-N-SH cell line and primary cultures, immunohistochemistry, and immunofluorescence to investigate the neurotoxicity of PCB 52 and Aroclor 1254 on mice tissue. We hypothesize that PCB 52 and Aroclor 1254 will show differing levels of toxicity and differing levels of toxicity on specific brain regions. Early findings suggest a divergence in both the toxicity of PCB 52 and Aroclor 1254 and neural structural differences in cortex and midbrain tissues. This experimental platform can be used to further assess other environmental toxicants.

ENDURE TRAINEE ABSTRACT

QUENTIN RICHARDSON

Home Institution and State: **Georgia State University, Georgia**
Email: **qrichardson1@student.gsu.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology, May 2016**
Mentors/Advisors at Home Institution: **Chris Goode, Ph.D., and Geert de Vries, Ph.D.**

ENDURE Trainee Scientific Interest:

I am interested in the biochemical and molecular cell aspects of neuroscience. A couple of diseases that I am interested doing research on are Parkinson's disease and Alzheimer's. One research approach that I would like to employ concerning these two diseases is to look at possible genes or molecular pathways that promote the disease, and regulate them. Another topic that I am interested in is drug addiction. I would like to study how the overuse and abuse of drugs affect the normal function of the neurological system, brain cells and molecular pathways. I am also interested in microbiology research. A bacterium that I am interested in studying is Borrelia burgdorferi, the bacteria that causes Lyme disease. I am interested in studying its effect on the nervous system. There are other things that I am open to researching given that it pertains to biochemical and molecular cell aspects of neuroscience.

ENDURE Trainee Career Goals and Plan:

My career goals and plans are to earn a PhD in neuroscience and perform biomedical research. After completing my PhD, I would like to complete a post-doc or two, and then start making research into a career. I would like to travel to different conferences telling other colleagues about my research, and also hear about different topics that others are researching. I would prefer to be a full-time researcher in industry, but moving into academia is a strong possibility. I do enjoy the academic environment and may find that I enjoy teaching others. I have also thought about starting a small biotechnology company; something I could call my own and take the research where I would want to take it.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Geert de Vries, Ph.D., and Matthew Paul, Ph.D.**

ENDURE Research Project Title: **Method for analyzing c-Fos colocalization in vasopressin and**

oxytocin cells within the PVN

Social play behavior in juvenile animals has been shown to have a significant impact on the development of adult social skills. By studying social play behavior in juveniles, we can get a better understanding of social skill development, and a better understanding of social development disorders such as autism spectrum disorder and attention deficit hyperactive disorder. However, little is known about what neural systems regulate social play behavior in juveniles. In this study, we investigate the periventricular nucleus of the hypothalamus (PVN) of juvenile rats to see if it plays a role in social play behavior in juveniles. In this experiment, we devised a method using fluorescent confocal microscopy to analyze the PVN of juvenile rats. Prior to this experiment, juvenile rats had social play interaction, then their brain tissue was stained for vasopressin, oxytocin, and c-Fos, which is an indication for neural activation. With the use of practice tissue, a standard exposure was determined for each fluorescent staining. Furthermore, a method for analyzing and counting vasopressin and oxytocin cells, as well as confirming if these cells are colocalized with c-Fos has been determined. Based on our standard exposure for each staining, the oxytocin and vasopressin cells, as well as c-Fos colocalization can be distinguished through tissue. Currently, micrographs of experimental tissue are being analyzed. In conclusion, we developed a procedure to be ideal for unbiased analysis of the experimental tissue using fluorescent confocal microscopy. Analysis of experimental tissue is not complete, but possible outcomes are the PVN plays a role in social play behavior in juvenile rats, or the PVN does not play a role in social play behavior in juvenile rats. If the PVN does play a role in social play behavior, future studies would be to manipulate the PVN.

ENDURE TRAINEE ABSTRACT

DEANNA ROSS

Home Institution and State: **Georgia State University, Georgia**
Email: **dross27@student.gsu.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Neuroscience, May 2017**
Mentors/Advisors at Home Institution: **Chris Goode, Ph.D., and Sarah Pallas, Ph.D.**

ENDURE Trainee Scientific Interest:

Neuroscience is an interdisciplinary field that requires a variety of skills and different patterns of thinking. This is why I was initially attracted to this field. Originally my interest in neuroscience was prompted by doing research on neurodegenerative disorders. As I have gained more laboratory experience, I have found more of an interest in brain plasticity. I am currently doing research in the lab of Sarah Pallas, Ph.D. on the visual system. Particularly, this research focuses on the molecular mechanisms that occur during brain development and brain trauma. Although I have not had laboratory experience in this area, I also have an interest in recreational drug use. As legislation changes on certain drugs, I think it's important to perform research on the molecular mechanisms of these drugs and their long term effects.

ENDURE Trainee Career Goals and Plan:

After graduating with an M.S./B.S. degree from Georgia State University, I plan to participate in a PhD program or an MD/PhD program. I have a strong desire to obtain a PhD in neuroscience. In the PhD program I am accepted into, I will take a path of academia. I will conduct dissertation research at a university where I will also study and potentially teach. I favor the idea of going into academia because of access to resources. If I decide to participate in an MD/PhD program, I would be balancing a job as both researcher and physician. I find that this would be very important because the work I do in the lab would have a direct impact. However, my goal would be to ultimately stay in an academic setting.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Sarah Pallas, Ph.D., and David Brian Mudd**

ENDURE Research Project Title: **Detection of ephrin-A5 in the superior colliculus of mice**

This research is focused on understanding the molecular mechanisms that aid in plasticity after damage to the visual system. In the visual system, Retinal Ganglion Cells (RGCs) send information to the superior colliculus (SC). Our lab uses a model for brain trauma in which the caudal SC is damaged at birth in hamsters. After the damage, the RGCs compress their retinotopic map onto the residual SC. Previous studies in mice and hamsters found that a class of axon guidance molecules called ephrins and their Eph receptors are expressed in a graded fashion in the SC and play a role during development. After neonatal partial tectal (PT) ablation in hamsters, both the retinocollicular map and ephrin-A5 expression gradient were shown to compress, leading to the question whether ephrinA5 is instructing the compression. In this lab, electrophysiology is used to assay a retinoptic map on an ephrinA knockout mouse model. Results have been ambiguous. To test whether different levels of ephrinA5 protein can be detected, a western blot was performed to quantify the differences in the knockouts. We find that there is not a statistical difference between a normal mouse and a mouse with an altered genotype ($p > .05$).

ENDURE TRAINEE ABSTRACT

JOSEPH ADAM SCHULTZ

Home Institution and State: **Emory University, Georgia**
Email: **jaschu2@emory.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Neuroscience and Behavioral Biology, May 2016**
Mentors/Advisors at Home Institution: **Yoland Smith, Ph.D., and Francisco Alvarez, Ph.D.**

ENDURE Trainee Scientific Interest:

My main scientific interests involve motor systems and the brain-machine interface, although I am interested in a myriad of research subjects that involve behavior, these two specific topics lie at the heart of my interests. Specifically, I hope to eventually blend these two main interests into the research of advanced prosthetics or the creation of more immersive virtual reality systems—an interest born out of my main hobby: video games. The pursuit of this interest has led me to researching the mechanisms behind basic reflexes. I believe the mechanisms behind these reflexes is the first step to improving the brain-machine interface, and the best way of increasing the efficiency of prosthetics and system interfaces is through the replication of natural mechanisms. I hope to expand on the knowledge I have gained last summer from working on IA afferent mechanisms by researching other mechanisms by which motor systems derive their function.

ENDURE Trainee Career Goals and Plan:

My current career goals are not set in stone. What is certain, however, is that I plan on going to graduate school where I intend to work in a lab that works on one of the research topics I mentioned in the previous sections. This will lead to my end goal for graduate school which is the pursuit of a Master's degree—possibly a Ph.D. After graduate school, I can only attest to desiring a career in the field of science. This is because I believe that my career will be determined by the opportunities available to me at the time. My plan, however, is to find a career in which I can further the field of research on various aspects of the brain-machine interface, specifically in the entertainment or medical sectors.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Francisco Alvarez, Ph.D., and Travis Rotterman**

ENDURE Research Project Title: **Changes in VGLUT1Synaptic Connectivity and the Presynaptic Inhibitory Inputs that Modulate Their Activity on Motoneurons Following Peripheral Nerve Crush**

Group IA afferents are pseudo-unipolar sensory neurons that constitute the muscle spindles in the periphery, where they detect changes in muscle length. They relay this information to the spinal cord, where they make excitatory synapses on motoneurons, and are responsible for inducing the stretch reflex. Previous work in cats has shown that 30% of IA afferents fail to reinnervate muscle spindles after nerve crush. This is reflected in 30% reduction in the amplitude of synaptic potentials elicited by muscle stretch on motoneurons (Prather et al., 2011). These same cats, however, demonstrate supranormal generation of force during stretch reflexes elicited after regeneration of these crushed nerves (Prather et al, 2011), suggesting that somehow transmission between IA afferents and motoneurons is facilitated during the stretch reflex. This phenomenon might be explained by a loss in presynaptic inhibition, via GABAergic control, of the IA afferent synaptic contacts on motoneurons. We therefore analyzed the density on injured and regenerating motoneurons of IA afferent synapses in adult female Wistar rats detected immunocytochemically through their content of vesicular glutamate transporter 1 (VGLUT1) and their presynaptic inhibition from GABAergic synaptic terminals expressing the 65 kDa isoform of glutamic acid-decarboxylase (GAD65).

BP-ENDURE AT HUNTER COLLEGE

HUNTER COLLEGE
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 MEMBERSMEMBERS:

Judith Diaz, Program Administrator - Hunter College
Dr. Regina Miranda – Hunter College
Dr. Chiye Aoki – New York University

ENDURE TRAINEE ABSTRACT

RUKA ADEROGBA

Home Institution and State: **CUNY Hunter College, New York**
Email: **ruka.aderogba@gmail.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Biochemistry, 2016**
Mentors/Advisors at Home Institution: **Chiye Aoki, Regina Miranda, and Vanya Quinones-Jenab**

ENDURE Trainee Scientific Interest

To pursue a career in Neuroscience with a concentration in adolescence, gut microbiome and the nervous system.

ENDURE Trainee Career Goals and Plan

I want to matriculate into an MD/PhD program and continue research while teaching.

ENDURE Trainee Summer Research Experience

ENDURE Summer Research Experience Institution: **New York University, Center for Neuroscience**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Evelyn Chen and Chiye Aoki**

ENDURE Research Project Title: **Social Isolation During Adolescence has Differential Effects on Apical Dendritic Branching of Pyramidal Neurons in Dorsal and Ventral Hippocampal CA1**

Social isolation during the vulnerable period of adolescence produces behavioral, physical, and biochemical alterations. The hippocampus is a component in the limbic system that plays a role in spatial learning, memory, anxiety and the regulation of stress. Interestingly, previous studies indicate that stress causes differential response in hippocampal sub-regions. The effects of stress have been shown to be gender specific. For example, females are more susceptible to stress-increased anxiety-related behaviors. Here, we tested the effects of social isolation, in Sprague-Dawley female rats during puberty (postnatal days 36-44), on the dendritic remodeling of the pyramidal neurons in the dorsal and ventral hippocampal CA1. Sholl analysis after the Golgi procedure indicated that in the ventral hippocampus, which preferentially regulates anxiety, social isolation evoked an increase in dendritic branching in the CA1 pyramidal neurons. On the other hand, in the dorsal hippocampus, which preferentially mediates spatial learning and memory, cells of animals under social isolation had fewer dendritic branches in stratum radiatum than in paired-housed controls. Together, our data indicate that social isolation of adolescent females elicits

pathway-specific changes in the hippocampus that may cause an increase in anxiety and a reduction in spatial memory performance.

ENDURE TRAINEE ABSTRACT

DANYAL ALAM

Home Institution and State: **Hunter College**
Email: **dalam2591@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **June 2015**
Mentors/Advisors at Home Institution: **N/A**

ENDURE Trainee Scientific Interest:

My research interests are grounded in the neurobiology of depression.

ENDURE Trainee Career Goals and Plan:

Following the completion of my undergraduate career, I plan to continue researching and matriculate into a graduate program in neuroscience to continue my research.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Ron Emeson**

ENDURE Research Project Title**: Interferon-Mediated Alterations in the Editing of Serotonin 2C Receptor RNAs**

Patients treated with interferon alpha (IFN-α) often report severe depressive symptoms that presumably result from the activation of numerous interferon-stimulated genes (ISGs). One such ISG is an isoform of ADAR1 (p150), an enzyme involved in the editing of numerous RNA transcripts by the site-selective conversion of adenosine-to-inosine (A-to-I). Aberrant editing of transcripts encoding the 2C-subtype of serotonin receptor (5HT2C) has been associated with depression, anxiety, and schizophrenia suggesting that interferon-mediated, p150-dependent alterations in 5HT2C function could, in part, underlie the etiology of mood and psychotic disorders. To test this hypothesis, C57BL/6J mice were injected daily with IFN-α for 14 days before the isolation of RNA from dissected the hippocampus, cortex, cerebellum, liver, spleen, heart, and aorta. Increased expression of transcripts encoding ADAR1 (p150) were observed in numerous brain regions and peripheral tissues in response to chronic interferon treatment. Similarly, the extent of editing for 5HT2C transcripts in interferon-treated animals was selectively increased at two sites (A and B) that previously have been shown to be preferentially edited by ADAR1 in the cortex. These results demonstrate that chronic interferon treatment for conditions such as hepatitis C infection and

multiple sclerosis could result in depressive symptoms by changes in ADAR1 expression and subsequent changes in RNA editing profiles.

ENDURE TRAINEE ABSTRACT

STEFANIE BALBUCA

Home Institution and State: **Hunter College, New York**
Email: **stefanie1955@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology, May 2015**
Mentors/Advisors at Home Institution: **Maria Figueiredo-Pereira**

ENDURE Trainee Scientific Interest:

My current interests lie in the expression of genes involved in the development of neuro-degenerative disorders. I am currently working on the effects that a product of inflammation (PGJ2) have in the expression of amyloid precursor protein.

ENDURE Trainee Career Goals and Plan:

I plan to apply to a PhD program in Neurobiology. Specifically, I am interested in Neuropathology, and I seek to obtain the training necessary to investigate how brain pathology develops.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Suzanne DeLaMonte**

ENDURE Research Project Title: **Alcohol and the nitrosamine NNK contribute to white matter degeneration and insulin signaling impairments**

Alcohol abuse can cause structural brain changes, thus negatively impacting brain functions, and leading to neuronal deficits that range from mild cognitive impairments to dementia. The detrimental effects that alcohol has on the brain are known as alcohol-related neuro-degeneration (ARN). ARN is primarily associated with insulin resistance and the atrophy of white matter, which is due to the loss of myelin. Furthermore, nitrosamine containing products produce similar effects to the ones seem in ARN. Previous studies of the nitrosamine related compound Streptozotocin, and the nitrosamines N-nitrosodiethylamine and N-Nitrosodimethylaminem have indicated that low exposures to nitrosamines appear to be implicated in insulin resistance, neuronal loss and oligodendroglial dysfunction. Since a large percentage of alcohol abusers are also cigarette smokers, it is necessary to investigate whether or not the Nicotine-Derived Ketone (NNK) can contribute or exacerbate the degenerative effects of ethanol.

ENDURE TRAINEE ABSTRACT

STEPHEN BRAREN

Home Institution and State: **Hunter College**
Email: **stephen.braren@gmail.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Psychology, Public Policy**
Mentors/Advisors at Home Institution:

ENDURE Trainee Scientific Interest:

My research interests include, broadly, the relationship between social influences and neuroscience from the cellular level to the behavioral realm. As such, I am interested in how the mechanisms of, for example, neural plasticity, epigenetics, and mirror neurons function in our fundamental nature as social beings. I am also interested in investigating how psychopathologies such as depression, anxiety, drug abuse, and autism are reciprocally mitigated by social and biological factors. Additionally, I hope to bridge the gap between neuroscience and its implications for society as a whole by being active in health, science, and education policy in an effort to maximize the potential and practical benefits of science for all members of society.

ENDURE Trainee Career Goals and Plan:

Upon obtaining a BA in Psychology and Certificate in Public Policy from Hunter College in 2016, I will pursue a PhD in Social and Cognitive Neuroscience, and embark upon a career as a neuroscientist, college professor, and public policy activist.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Hunter College**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Peter Serrano**

ENDURE Research Project Title: **Methamphetamine-Induced Short-term Increase and Long-Term Decrease of Spatial Working Memory Performance Involving Protein Kinase M zeta (PKMz) in the Hippocampus and Dorsal Striatum**

Methamphetamine (MA) is a toxic, addictive drug shown to modulate learning and memory, yet the neural mechanisms are not fully understood. We investigated the effects of 2 weekly injections of MA (30 mg/kg) on working memory using the radial 8-arm maze (RAM). MA-treated mice initially showed a significant improvement in working memory compared to controls. Following 5 weeks of MA abstinence, mice were re-trained on a reference and working memory version of the

RAM to assess cognitive flexibility. MA-treated mice showed significantly more working memory errors. Hippocampus and dorsal striatum were assessed for expression of glutamate receptors subunits, dopamine markers, and memory markers. Within the hippocampus, PKMz and GluA2 were both significantly reduced after MA, supporting the poor memory performance. Additionally, a significant increase in GluN2b and decrease in D1 identified dysregulated synaptic function. In the striatum, MA treatment increased cytosolic DAT and TH levels associated with dopamine hyperfunction. MA treatment significantly reduced GluN2b while increasing both PKMz and PKCz within the striatum. We discuss the potential role of PKMz/PKCz in modulating dopamine and glutamate receptors after MA treatment. These results identify potential underlying mechanisms for working memory deficits induced by MA.

ENDURE TRAINEE ABSTRACT

ALEX CHEN

Home Institution and State: **New York University**
Email: **ac3661@nyu.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Neuroscience, Spring 2015**
Mentors/Advisors at Home Institution: **Gary T. Philips and Thomas J. Carew at New York University**

ENDURE Trainee Scientific Interest:

My research interest lies within the field of learning and memory and understanding the underlying molecular mechanism of how organisms attain and retain information over time. Memory is a universal feature in almost every organism and is especially crucial in some organisms for survival. For this reason and also many others, I find memory to be an important field of research. It interests me because the many organisms that exhibit memory formations also learn at different rates with different parts of the brain yet there is an encompassing mechanism down to the molecular level that can explain the common theme.

ENDURE Trainee Career Goals and Plan:

I would like to enroll in graduate school to pursue a PhD in neuroscience to attain new skill sets as well as improve my current ones so that I can further my goals as a researcher. Most importantly, I would like to attend graduate school to improve my critical thinking skills in order to ask more profound questions.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Karla Kaun**

ENDURE Research Project Title: **The Effects of Activating Dopaminergic Neurons on Alcohol-Induced Behaviors in Drosophila Melanogaster**

Acute alcohol treatments stimulate locomotor behavior in a wide array of organisms. To further understand alcohol-induced effects, it is crucial to investigate where within the central nervous system alcohol plays an important role. Drosophila melanogaster is an ideal model organism to characterize these effects because there are many neurogenetic tools to manipulate neurotransmission with precise temporal and spatial control. However, the neural circuits underlying alcohol-included locomotor responses in Drosophila are not well characterized. Previous

studies have shown a role for both dopamine and the mushroom body in alcohol-induced changes in locomotion. We used a new library of neurogenetic tools that allow control of gene expression in single dopaminergic neurons projecting to the mushroom body. We used Chrimson, a channelrhodopsin, to stimulate these neurons in behaving flies and measure locomotor responses. Chrimson stimulates neural transmission when activated with red light, which can penetrate the cuticle of the fly without affecting its naïve response. We found that activating a small subset of dopaminergic neurons projecting to the mushroom body generated ethanol-induced like behaviors in flies despite the absence of ethanol treatment. These results provide a specific central brain circuit for investigating the neural and molecular mechanisms underlying alcohol-induced changes in locomotor activity.

ENDURE TRAINEE ABSTRACT

LAURA CRACIUM

Home Institution and State: **New York University, New York**
Email: **lc1939@nyu.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Neural Science, May 2015**
Mentors/Advisors at Home Institution: **Dr. Adam Carter**

ENDURE Trainee Scientific Interest:

The research experiences that I have had at NYU, Brown University, and the University of Michigan have all greatly expanded my knowledge in the field of neuroscience. I was able to learn various techniques such as electrophysiology, optogenetics, immunohistochemistry, and total internal reflection microscopy. At the moment in my NYU lab, I am exploring the functional properties and circuitry of neurons in the prefrontal cortex, an area of the brain involved in high-level processing and behaviors. I am looking forward to graduate school where I can use my past experiences and learn novel techniques in order to explore my interests in neuroscience. I am particularly interested in the cellular mechanisms of vesicular trafficking and the presynaptic activity that leads to secretion.

ENDURE Trainee Career Goals and Plan:

I am currently applying to graduate schools this fall with the hopes of obtaining a PhD in neuroscience. I am also applying to the NSF Graduate Research Fellowship Program that will fund my research interests. In the future, I hope to become a scientist at an institution that will support my attempts to answer my many questions in neuroscience. I would like to one day do research abroad to expand my knowledge in neuroscience research cross-culturally. I am also very interested in science outreach, specifically to disadvantaged populations. I would like to expand the outreach programs that I have been a part of in college throughout my education and career.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Ronald Holz**

ENDURE Research Project Title: **Possible Role of Alpha-Synuclein in Secretion**

Alpha-synuclein is a presynaptic protein with unknown function implicated in many neurological disorders, most importantly Parkinson's disease (PD). In PD the alpha-synuclein gene can be overexpressed (gene duplication or triplication) or contain point mutations (including those in the

N-terminus: A30P or A53T). The N-terminus of alpha-synuclein forms an amphipathic alpha-helix, allowing it to interact with phospholipid membranes. We hypothesize that the protein could function in membrane curvature and fusion pore stabilization. Our goal was to examine the effects of mutated alpha-synuclein A30P, A53T, and overexpression on discharge of tissue plasminogen activator (tPA) upon fusion of individual granules in bovine chromaffin cells. The cells were co-transfected with plasmids encoding alpha-synuclein and tPA-pHluorin and imaged with total internal reflection fluorescence microscopy. The pH-sensitive properties of pHluorin indicated when secretion was occurring. We found that in cells overexpressing wild type synuclein, tPA-pHluorin took longer to reach peak intensity compared to the control, while cells expressing synuclein (A30P), tPA-pHluorin reached maximum more rapidly. No significant effects were seen with the synculein(A53T)-expressing cells. These data are consistent with synuclein being able to alter the time course of fusion possibly, through effects membrane curvature.

ENDURE TRAINEE ABSTRACT

THEMASAP KHAN

Home Institution and State: **New York University, New York**
Email: **themasap.khan@nyu.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Neural Science, May 2015**
Mentors/Advisors at Home Institution: **Dimitris G. Placantonakis, M.D., Ph.D**

ENDURE Trainee Scientific Interest:

My research interests include plasticity, gliablastomas, channelopathies, emotion, cancers, pediatric afflictions, and learning in the neurosciences. I want to learn about the deeper issues presented in clinical patients with gliablastomas and brain cancers and to work on developing novel therapeutics that target neurons cultured through induced pluripotent stem cells using different biochemical, molecular biology, and neurobiology techniques.

ENDURE Trainee Career Goals and Plan:

My main focus in research right now is to maintain strong academic credentials in order to gain entry into graduate school to pursue my interests in the neurosciences by harnessing the power of stem cell technologies.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Jack M. Parent, M.D.**

ENDURE Research Project Title: **Influence of Human Astrocytes on iPSC-derived Neural Progenitor Cells following Co-culture in vitro**

Astrocytes provide trophic support for neuronal development, integration and synapse maturation. Thus, astrocytes are likely an important tool for enhancing maturation of induced-pluripotent stem cell-derived (iPSC) neural progenitor cells (NPCs). Here, we characterized the astrocytic properties of Normal Human Astrocytes and investigated their ability to enhance neuronal maturation of iPSC-derived NPCs when co-cultured for 4-5 weeks. Astrocytes were cultured over several passages to determine the proliferative capacity, the substrates necessary for astrocyte:neuronal co-culturing, the neuronal cell density, and whether inhibition of the notch pathway via a B-secretase inhibitor (Compound E) would enhance neuronal maturation in the presence or absence of astrocytes. Our studies show that astrocytes expressed the glial markers GFAP and S100B at the first passage but

expression of these markers declined over time. In astrocyte:neuron co-cultures a neuronal plating density of 16,000 cells/cm2 was optimal for neuronal growth, and the preferred substrate was Matrigel. Unfortunately, the human astrocytes were absent by 5 weeks of co-culturing making it difficult to assess the effect of compound E. These studies suggest that it will be necessary to use early passage astrocytes, and in co-culture experiments, the neural medium should be adjusted to support both the astrocytes and neurons.

ENDURE TRAINEE ABSTRACT

JING LIANG

Home Institution and State: **Hunter College of the City University of New York, New York**
Email: **jingliang92@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology, May 2015**
Mentors/Advisors at Home Institution: **Vanya Quinones-Jenab, Regina Miranda, Chiye Aoki, and Jesus A. Angulo**

ENDURE Trainee Scientific Interest:

My interests in neuroscience are primarily in the development of neurological disorders, but range from neuropharmacology to endocrinology. I am interested in studying how physiological changes in the brain mediate or motivate behaviors. I am also interested in how the brain changes during development and what mechanisms serve and/or divert its purposes in neurological disorders. I prefer an interdisciplinary approach to combine behavioral analyses with measurements of signaling mechanisms and neurotransmission on a molecular and cellular level.

ENDURE Trainee Career Goals and Plan:

I hope to matriculate into a PhD program in neuroscience and pursue a career in academia to teach at a university level. Ultimately, I hope to not only continue research, but to expand the knowledge about the benefits of research to aspiring youth through academic mentorship.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Michigan, Ann Arbor**

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

ENDURE Research Project Title: **Estrous Cycle and Motivation for a Cue Linked to a Food Pellet**

Sex-based neural mechanisms behind motivation and reward are poorly understood. Previous research has demonstrated that nucleus accumbens dopamine signals ultimately predict cue presentation and not food presentation after an associated cue (CS+) has been experimentally linked to a reward. It is postulated that estradiol regulates motivation for a CS+ and induces an estrous cycle effect. It is also postulated that a CS+ by itself can acquire and maintain incentive salience in food seeking behaviors. Therefore, the two goals of this project are to determine whether the CS+ can serve as a motivator for shaping a secondary (rearing) behavior and whether the estrous cycle modulates that motivated behavior for the CS+. Female rats were introduced to a

FR1>FR2>FR3>FR5>FI(15s) operant training paradigm to associate a cue-light with a food pellet and were afterwards trained to exhibit a rearing behavior to elicit the cue-light. Preliminary data shows an estrous cycle effect for a FR5 schedule and an evident drop in food retrieval for a prosetrus/estrus day on a FI(15s) schedule. Rearing training did not show significance towards a CS+ acquiring incentive salience but there is an evident increase in number of rears over time, indicating that a CS+ may indeed acquire incentive salience. Theme and Topic: F. Cognition and Behavior Grant/Other Support: BP-ENDURE NIH-NINDS # R25-NS080686; NSF IOS1353263

ENDURE TRAINEE ABSTRACT

PRIYANKA RAMESH

Home Institution and State: **New York University; New York**
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Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Neuroscience, May 2015**
Mentors/Advisors at Home Institution: **Professor Lynne Kiorpes**

ENDURE Trainee Scientific Interest:

I am interested in the field of neuroplasticity (from a systems perspective) and decision-making. I am interested in the brain as a network, and how the networks change and interact with each other with the ever-changing environment.

ENDURE Trainee Career Goals and Plan:

I plan on a career in academia. I would like to obtain a PhD in Neuroscience and eventually become a professor in a research institution.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Professor Lynne Kiorpes**

ENDURE Research Project Title: **Object Representation in the Primate Brain**

Our capability to visually recognize objects is a fundamental and important skill. We recognize objects despite considerable variation to the image, such as rotation, viewing perspective or size, which raises an important question: does the primate brain have "innate" representations of certain objects? This experiment seeks to understand the development of object representation in the brain. We will examine whether object recognition performance differs for biologically relevant versus irrelevant objects in young non-human primates. We hypothesize that if there are "innate" object representations, then they will exist for biologically relevant, natural stimuli and that these stimuli will be processed preferentially to non-relevant stimuli. An Odd-Man-Out Task will be used in which a monkey will choose which of three stimuli is different from the other two – the distractors. A short presentation time will be used to prevent complete object processing and reveal whether or not the animal will perform better with certain stimulus types. Performance will be assessed by accuracy and reaction time. If biologically relevant stimuli are processed faster than the non-biologically relevant stimuli, then it is expected that the brain may be hard-wired to

process biologically relevant objects. Ultimately, this study will inform whether particular classifications are "innate" in the brain.

ENDURE TRAINEE ABSTRACT

CRISMELDY VELOZ

Home Institution and State: **Hunter College of the City University of New York**
Email: **crismeldyveloz12@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology 2015**
Mentors/Advisors at Home Institution: **Dr. James Gordon**

ENDURE Trainee Scientific Interest:

Given my interest in examining the causes and consequences of epilepsy and autism, I am obtaining practical experiences that will enable me to conduct research in clinical environments. Currently, I am preparing to start the second half of my honor's thesis in Dr. James Gordon's Visual Psychophysiology Lab at Hunter College. My present research project focuses on determining if sex differences exist in long and short-range lateral interaction in males and females. We are testing this theory by using a neurophysiological assessment of the visual system call visual evoked potentials (VEPs). VEPs provide a noninvasive technique that is used to evaluate the functional integrity of visual pathways in the brain. VEPs are often used to examine specific pathways in the visual system of patients with a variety of clinical disorders. Findings from previous VEP studies have provided significant implications for disorders such as autism, epilepsy, schizophrenias, cerebral palsy, glaucoma and amblyopia.

ENDURE Trainee Career Goals and Plan:

Upon graduating from Hunter College, I plan to pursue a PhD in hopes of studying the aspects of epilepsy and autistic spectrum disorders. In addition, I want to conduct research where I can connect the inherited components of these types of diseases utilizing neurogenetics. I also look forward to forming a research training group where mentors can visit high school students and provide them with information about careers and training in research. Overall, my goal is to work with individuals such as myself who possess a passion and dedication to improve the lives of others through research.

ENDURE Trainee Summer Research Experience:

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

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

ENDURE Research Project Title**: The Study of Personality Traits in Relation to the Acute Subjective Effects of Amphetamine in Healthy Participants**

Individual differences in relation to d-amphetamine (AMPH) effects on measures of personality

traits have been reported. Although the causes of such between subject differences are not clear, behavioral tests show an association between the neurochemical mechanism of direct drug effects and the actual neurobiological basis of personality traits. This study was designed to investigate the relationship between AMPH response and a measure of reward sensitivity (Social Potency; SP) and of impulse (Control; CL). We hypothesized that individuals with high trait Social Potency would have greater positive activation response to moderate-dose d-amphetamine. We also hypothesized that individuals with low trait Control would have lower positive activation response to d-amphetamine. We tested these hypotheses using The Multidimensional Personality Questionnaire (MPQ) and the Drug Effects Questionnaire (DEQ). We evaluated these effects in N = 45 healthy participants, ages of 18-35. Responses from the MPQ and the DEQ were compared using Pearson correlation coefficients. Findings suggest that individual differences in responses to stimulant drugs may be directly influenced by individual differences in personality. Future research should pay critical attention to the MPQ-Control scale in relation to DEQ outcomes and evaluate brain correlates of these traits and states. This project was funded by the National Institute on Drug Abuse (NIDA) Grant # DA020725/ DA029189 and by BP-ENDURE NIH-NINDS Grant # R25-NS080686

ENDURE TRAINEE ABSTRACT

ELYCE WILLIAMS

Home Institution and State: **Hunter College. CUNY, New York, NY**
Email: **Elyce.Williams80@myhunter.cuny.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Psychology, 2016**
Mentors/Advisors at Home Institution: **Dr. Michael Siller**

ENDURE Trainee Scientific Interest:

I hope to do research that creates a bridge between the field of education and neuroscience in the hopes to build and improve upon teaching methods, exploring different learning styles in children as early as preschool. I am also interested in the effects of anxiety and social stigma on children and how that affects brain development as well as learning and comprehension ability.

ENDURE Trainee Career Goals and Plan:

After graduating from Hunter College in 2016, I plan to attend graduate school and to ultimately obtain my Ph.D. I would like to work in the area of developmental neuroscience as it relates to the growth and changing of the brain, and/or behavioral/cognitive neuroscience as it pertains to memory, perception, and learning.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Laurie Cutting**

ENDURE Research Project Title: **The Implications of SES in Brain Structure across the Lifespan: A Cross-Sectional MRI Study**

PhD Socioeconomic status (SES) has been found to predict memory retention, learning ability and aptitude for reasoning/perception, along with additional health outcomes. Studies examining brain structure have explored correlations between gray matter volume and SES, in regions such as the hippocampus and prefrontal cortex. Some findings indicate that individuals with higher SES show increased brain volume, and others suggest high SES correlates with greater preservation of behavioral and cognitive function with age. Few studies however, examine these implications throughout the lifespan, instead focusing on children/adolescents and older adults. Using data gathered from 58 contributors (n=6142), the present study explores the effects of SES on gray matter brain volume across the lifespan (0-98 years) using a cross-sectional whole-brain analysis.

SES was measured using education level as an indicator, which narrowed the sample (n=2296). Results for this comparatively large and comprehensive study are in progress. Data are being analyzed on Vanderbilt ACCRE cluster for structural analysis using volumetric assessment methods. The primary method of analysis is a multivariate model with 15 identified networks of interest. A secondary analysis is also being conducted, consisting of univariate models for education, age, sex, and handedness on 133 identified regions of interests. Acknowledgments: Grants: HHSN271201300672P (NIA) R01HD044073 R01HD067254 P41EB015909 The National Center for Research Resources (UL1RR024975) The National Center for Advancing Translational Sciences (2UL1 TR000445) BP-ENDURE NIH-NINDS # R25-NS080686 This work was conducted in part using the resources of the Advanced Computing Center for Research and Education at Vanderbilt University, Nashville, TN. Theme: development

ENDURE TRAINEE ABSTRACT

TAMAR K. WINER

Home Institution and State: **Hunter College; City University of New York, NY**
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Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology, Spring 2015**
Mentors/Advisors at Home Institution: **Dr. Glenn E. Schafe**

ENDURE Trainee Scientific Interest:

I am interested in understanding mechanisms by which stress influences brain function, including learning, memory, plasticity, and resilience. Additional interests include circuitry of the temporal lobe and mechanisms of epilepsy. In Dr. Glenn E. Schafe's lab at Hunter College, we are studying the effects of chronic stress on fear memory modulation, using a dietary manipulation in an animal model of PTSD. We employ both behavioral and biochemical techniques including Pavlovian fear conditioning, elevated plus maze, Western blotting, and Golgi staining.

ENDURE Trainee Career Goals and Plan:

Following graduation from Hunter College in Spring 2015, I will pursue a Ph.D., researching the influence of stress on brain function. Once I obtain my doctorate, I intend to conduct research and teach within academia. My success will be enhanced through supporting under-represented students in neuroscience research, as the ENDURE program has done for me.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Sean M. Polyn**

ENDURE Research Project Title: **Semantic Relatedness through Spreading Activation: A Conceptual model using Wikipedia**

How the human memory system stores and retrieves semantic information is not well understood; existing models of semantic memory are limited to understanding the relatedness of individual words to one another (e.g., Landauer & Dumais, 1997; Steyvers et al., 2004). To increase the scope of semantic memory models, we examined a technique designed by Gouws et al. (2008) to estimate the relatedness of any pair of concepts appearing as pages in Wikipedia. This technique uses Wikipedia to create a spreading activation network, with a unique node for each page, and links defined by the set of hyperlinks from that page to other pages. Spreading activation theory

assumes that when a node is stimulated, activation energy spreads along the links of its network to recipient nodes. The final activation pattern across the network is a representation of the item in question. We used this technique (the Wikipedia Hyperlink Model, or WHM) to create semantic representations for a set of categorized stimuli (e.g. celebrities, landmarks, and objects). When examining the similarity structure, we found that the representations derived from the model respected the category structure of the items. We discuss the potential for this technique in evaluating behavioral effects in memory search. This summer research was funded in part by BP-ENDURE NIH-NINDS Grant# R25-NS080686.

BUILDING RESEARCH ACHIEVEMENT IN NEUROSCIENCE (BRAiN)

UNIVERSITY OF COLORADO DENVER
Principal Investigators: *Dr. Diego Restrepo and Dr. Elba Serrano*
Partner Institution: New Mexico State University

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

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

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

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

ADDITIONAL PROGRAM TEAM MEMBERS:
Dr. Ernesto Salcedo – University of Colorado Denver Anshutz Medical Campus
Dr. Sondra Bland – University of Colorado Denver Downtown Campus

ENDURE TRAINEE ABSTRACT

TERESA L DAVIS

Home Institution and State: **University of Colorado, Denver**
Email: **teresa.l2.davis@ucdenver.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Integrative Biology, Fall 2015**
Mentors/Advisors at Home Institution: **Diego Restrepo, Ph.D., Ernesto Salcedo, Ph.D., Sondra Bland, Ph.D., and Bruce Appel, Ph.D.**

ENDURE Trainee Scientific Interest:

My greatest interest is in Neurobiology and studying the development of the central nervous system. I have a deeper interest in understanding the mechanisms by which neuronal diseases such as Parkinson's, Alzheimer's and Huntington's occur. Although we can genetically determine whether or not an individual has a predisposition for such diseases, I want to study the initial trigger of these diseases and how to delay or prevent onset.

ENDURE Trainee Career Goals and Plan:

My dream is to combine research with a neurology practice in which I am able to help my patients by staying up-to-date in cutting edge research through performance. Upon graduation I hope to enter into a medical scientist program which will allow me the opportunity to obtain a PhD in neuroscience while also working toward an MD.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Bruce Appel, Ph.D.**

ENDURE Research Project Title: **Mechanisms of Adult Neural Stem Cell Specification**

A fundamental goal of developmental neurobiology is to identify mechanisms that maintain neural precursors throughout embryogenesis. One possible mechanism by which precursors may be maintained is through Notch receptor mediated signal transduction; however, our understanding of how Notch receptor activity preserves neural precursors is incomplete. We hypothesize that the Notch signaling pathway, activated by Delta ligands, maintains a subset of ventral spinal cord precursors that give rise to oligodendrocytes, the myelinating cells of the central nervous system, at post embryonic stages. To test this hypothesis we investigated Notch signaling activity by

analyzing a transgenic Notch reporter gene, which expresses fluorescent protein in Notch-responsive cells. Additionally, we are using genetic and pharmacological loss of function tests to examine whether Notch signaling is necessary to maintain neural precursors throughout embryogenesis. Examination of embryos between one and four days post fertilization revealed Notch signaling in neural precursors. These data indicate that the Notch signaling pathway is being utilized in a subset of ventral spinal cord precursors, which supports our hypothesis that Notch signaling is involved in the maintenance of these precursors.

ENDURE TRAINEE ABSTRACT

JAZMIN FONTENOT

Home Institution and State: **University of Colorado, Denver**
Email: **jazmin.fontenot@ucdenver.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Biology, May 2016**
Mentors/Advisors at Home Institution: **Alexia Nunez-Parra, Ph.D., Diego Restrepo, Ph.D., and Sondra Bland, Ph.D**

ENDURE Trainee Scientific Interest:

The BRAiN program, through ENDURE, has allowed me to narrow down an interest in neuroscience to the specific field of neurochemistry. I want to manipulate and study the role of neurotransmitters in the brain and their effect on other biological molecules.

ENDURE Trainee Career Goals and Plan:

After my completion of BRAiN, I plan to attend a neuroscience-related graduate program and obtain a PhD. My career goal is to have a research lab that synthesizes organic compounds for the benefit of the brain such as creating a drug that minimizes or cures Alzheimer's disease.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Alexia Nunez-Parra, Ph.D., and Diego Restrepo, Ph.D.**

ENDURE Research Project Title: **Role of Acetylcholine on Sniffing Behavior**

Sniffing is an active process necessary for odor detection and discrimination. In rodents, a single sniff can distinguish odors with a one-carbon chemical difference, however this requires attention to an external stimulus. Previous studies have linked acetylcholine signaling in the brain to attention and learning. The olfactory bulb is known to receive cholinergic projections from the Basal Forebrain, particularly from the Horizontal Limb of the Diagonal Band of Broca (HDB). In this study, we examine the role acetylcholine plays in olfactory driven behavior. To test the effect acetylcholine has on sniffing behavior, we used an optogenetic approach to activate cholinergic neurons in the HDB. Mice transgenically modified to express channelrhodopsin allowed for precise stimulation of targeted neurons. We inserted an optotetrode, consisting of a movable optic fiber and a tetrode bundle, into the HDB to record firing frequency and activate cholinergic neurons. To

measure sniffing, we inserted a cannula into the nasal cavity and connected it to a pressure sensor. Preliminary results indicate that activation of cholinergic neurons changes sniffing frequency in awake mice and not in anesthetized mice. We predict that increasing acetylcholine release in the HDB momentarily increases sniffing frequency.

ENDURE TRAINEE ABSTRACT

HALIMAH HAMIDU

Home Institution and State: **University of Colorado, Denver**
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Undergraduate Academic Level: **Senior, Post-Baccalaureate**
Undergraduate Major and Expected Graduation Date: **Biology, 2016**
Mentors/Advisors at Home Institution: **Dr. Sondra Bland**

ENDURE Trainee Scientific Interest:

I currently have an interest in the neurobiological effects of social isolation on the developing brain. In the future I hope to have the chance to also explore neuropathological research focusing on recovery from traumatic brain injuries.

ENDURE Trainee Career Goals and Plan:

I intend to either pursue an MD/PhD or to seek a research fellowship after completing medical school.

ENDURE Trainee Summer Research Experience:

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

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

ENDURE Research Project Title: **Aggrecan in the Down Syndrome Brain**

Aggrecan is a proteoglycan found in the extracellular matrix (ECM) of the brain. Higher levels of aggrecan expression in specific areas of the hippocampus correlate with lower levels of amyloid beta plaques and neurofibrillary tangles, both of which are trademark characteristics of Alzheimer's disease (AD). Since Down syndrome (DS) is closely linked to AD, we measured aggrecan expression in TS65Dn trisomic mice. To determine whether potential results were DS specific or indicative of general cognitive dysfunction and not age-related AD, homocystinuric (HO) mice were used as another model of cognitive dysfunction. We measured the relative aggrecan expression in 3 areas of the hippocampus in DS mice at 4 months, 12 months, and 18 months, control mice (disomic littermates) at 4 months and 12 months, and HO mice at 5 months using immunohistochemistry. Our results indicate that aggrecan levels increase within the Lacunosum moleculare (LM) of the CA1 between 4 months and 12 months in both DS and control mice. Interestingly, aggrecan expression decreased in 18 month DS mice. Young adult HO mice had significantly elevated levels of aggrecan

in the LM when compared to their DS and control young counterparts, suggesting that aggrecan expression in the LM may not be directly involved in other forms of cognitive dysfunction. This work confirms previous studies demonstrating increases in aggrecan expression as mice age. Additionally, the results of this study provide the basis for further research exploring aggrecan expression in older mutant mice strains, which may provide additional insight into differential aggrecan expression in DS or AD.

ENDURE TRAINEE ABSTRACT

RYLIE HIGHTOWER

Home Institution and State: **New Mexico State University, New Mexico**
Email: **swimmer1@nmsu.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Nursing, May 2015**
Mentors/Advisors at Home Institution: **Dr. Jennifer Fabre**

ENDURE Trainee Scientific Interest:

When I began my journey into neuroscience, I had an extremely broad goal of "doing neuroscience." As I've progressed through the BP-ENDURE BRAiN Program, my scientific focuses have gotten slightly more specific as I've realized where my neuroscience interests actually lie. Currently I'm interested in molecular neuroscience as a general umbrella area of focus. Within that molecular umbrella, I am interested in developmental neuroscience, neuropharmacology, and neuro-oncology. Alongside molecular neuroscience in these areas, I also have developed a strong interest in the area of clinical neuroscience, focusing on neurological disorders.

ENDURE Trainee Career Goals and Plan:

Because my career goals have drastically changed very recently, I am still trying to refine what my specific career goals are. I am planning on completing graduate school applications this fall semester for Molecular Biology and Neuroscience PhD programs. From there, I will choose to go where I feel I am best suited to pursue a doctorate with a research focus in neuroscience.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Emily Bates**

ENDURE Research Project Title: **MICAL2: A Probable Ectodermal Development Modulator**

During embryonic development, ectoderm differentiates into external tissues and structures of a developed human, such as skin, hair, nails, and teeth. The CNS also develops from differentiating ectoderm. Currently, ectodermal dysplasia (ED) is considered a hereditary, congenital disorder that results in abnormalities of those external tissues and structures. The analysis of one specific family shows that some members have ED and some members have autism. MICAL2 is a gene that has shown to be mutated in each family member that has ED or autism. Previous work shows MICAL2 is needed for axon guidance and actin depolymerization. This study was to determine the role

MICAL2 plays in ED and Autism. Site-directed mutagenesis is being used to clone and replicate the affected family members' mutation. Further work will use "Knockdown" and "Rescue" methods to "knockdown" MICAL2 function in wildtype cells where cell function can then be assessed. We predict that normal cell developmental function will occur with a wildtype MICAL 2 rescue but normal cell development will cease with a mutant MICAL2 rescue. The exact abnormalities that will occur on the cellular level with the mutant MICAL2 rescue are unknown and will be assessed at the time of observation.

ENDURE TRAINEE ABSTRACT

FAVINN MAYNARD

Home Institution and State: **University of Colorado Denver**
Email: **favinn.maynard@ucdenver.edu**
Undergraduate Academic Level:
Undergraduate Major and Expected Graduation Date:
Mentors/Advisors at Home Institution: **J. Ryan Osterberg, Arthur Boo and Jefferson Knight**

ENDURE Trainee Scientific Interest:

ENDURE Trainee Career Goals and Plan:

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution:

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title: **Investigating the Effects of Methanethiosulfonate Spin Labeling on the Behavior of the Synaptotagmin 7 C2A Domain**

Synaptotagmin (syt) 7 is a ubiquitously expressed membrane trafficking protein that plays an important role, along with SNARE proteins, in membrane docking and fusion during Ca^{2+} induced exocytotic events. The membrane binding function of syt7 is derived from its two C2 domains, C2A (studied here) and C2B. Singular cysteine mutants were made at key positions in the C2A Ca^{2+} binding loop and methanethiosulfonate spin labels were attached via disulfide bonds. The spin labels include unpaired electrons allowing for the later use of electron paramagnetic resonance (EPR) to determine membrane-docking geometry. In order to test whether each spin-labeled mutant maintained folding and membrane docking properties similar to the native domain, the membrane association and dissociation kinetics of each mutant were measured via stopped flow fluorescence spectroscopy. Results are compared to both the wild-type domain and a control mutant in which the lone native cysteine residue was mutated to serine. Our findings indicate that function is perturbed in only four of 17 mutants. Methanethiosulfonate spin labels introduced at the remaining 13 positions alter membrane binding and release by less than a factor of 2.5, a level judged to be minor. These spin-labeled mutants have thus been used to determine the docking

geometry of the membrane-bound syt7 C2A domain using EPR.

ENDURE TRAINEE ABSTRACT

REANNA MESSER

Home Institution and State: **New Mexico State University, New Mexico**
Email: **rmesser@nmsu.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology, December 2014**
Mentors/Advisors at Home Institution: **Dr. Mary Alice Scott**

ENDURE Trainee Scientific Interest:

For the past three years, I have been exposed to a variety of research including public health, organic chemistry, and neuroscience. These experiences have led me to become fond of neurobiological research in particular. I now see neuroscience as an interdisciplinary field that demands rigorous knowledge of cellular biology with procedures that demand knowledge in chemistry and physics. The field requires sharpened innovators and investigators; furthermore, it is something I am passionate about and a field that I am highly motivated to excel.

ENDURE Trainee Career Goals and Plan:

I hope to gain my PhD in a neuroscience field, preferably one that has interdisciplinary studies. This invaluable aspect on research transforms biologists into neuroscientists with the ability to think and train between many, varied labs. This not only advances research but also allows a scientist to approach a specified question from multiple angles which will allow me to excel as a scientist, professional, and teacher. I then hope to enter an academic or corporate position, though this aspect of my plan will be determined during graduate school.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Tony Wyss-Coray**

ENDURE Research Project Title**:** **Endogenous, Self-Secreted VEGF Regulates Neural Stem Cell Maintenance In Vivo**

Neurogenesis begins with neural stem cell differentiation into rapidly dividing neural progenitor cells (NPCs). This process is regulated, in part, by vascular endothelial growth factor (VEGF), which has been shown to support NPC proliferation and neuronal survival. Previous research has assumed VEGF in the dentate gyrus (DG) to derive from astrocytes, but the Wyss-Coray lab recently showed that VEGF is highly secreted by neural stem/progenitor cells (NSPCs) in vitro. This data indicates

that self-secreted VEGF may be essential for stem cell maintenance in the NSPC pool. In this study, we aimed to characterize the effects of endogenous VEGF on NPCs and NSCs in vivo. We utilized a transgenic mouse model, CreERT2;VEGFflox/flox to knockdown the expression of VEGF within NSPCs. Using immunohistochemical staining, we show that VEGF knockdown in NSPCs led to an increase in NSC density and NPC proliferation at an early time point (21 days after knockdown), but VEGF knockdown led to depletion of proliferating NSC and NPC density at a later time point (60 days after knockdown). This pattern of proliferation surge followed by a loss of proliferative capacity is consistent with impaired stem cell maintenance. These results identify endogenous, autocrine VEGF as an essential regulator of adult neural stem cell maintenance, and suggests that the actions of VEGF are, at least in part, vital to NSC pool regulation and neurogenesis control.

ENDURE TRAINEE ABSTRACT

KATHRYN SANCHEZ

Home Institution and State: **New Mexico State University, New Mexico**
Email: **ktsanch@nmsu.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology, May 2015**
Mentors/Advisors at Home Institution: **Elba E. Serrano**

ENDURE Trainee Scientific Interest:

Neurodegenerative diseases are my primary interest, and in particular the use of anatomy and histology to study the autoimmune disorder Multiple sclerosis. This curiosity has fostered by my numerous laboratory experiences as an undergraduate research assistant. In particular, I have conducted histology using both paraffin and resin sections in my research while a member of the Serrano and Ghiso labs. By investigating diseases such as Alzheimer's disease and Multiple sclerosis, pathology has stood out as my subject of concentration. Given both experiences with immunohistochemistry (ICH) and other staining methods, I have learned the importance of proper microscopy skills when conducting such investigations. This will prove to be a valuable tool as I continue to pursue my interest in histology. Eventually, I would like to learn EM and other microscopy techniques to further analyze the myelin sheath.

ENDURE Trainee Career Goals and Plan:

My goal is to pursue a PhD in neuroscience, specifically to work in a lab related to the field of neuropathology. This training would enable me to investigate neurodegenerative diseases, and would provide a skillset that will allow me to conduct scientific research for a government agency. To supplement the neuroscience PhD, I plan to receive a Masters in Public Administration so that I am equipped with expertise in bureaucracy. This would allow me to communicate the importance of research funding to legislators. While lobbying for more basic research funding, I also plan to teach a course in undergraduate bioethics or science policy. This is especially needed given the dynamic nature of technology, so that the next generation of scientists will be well equipped to discuss the ethical implications of research and technology.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **New York University, Langone Medical Center**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Jorge Ghiso**

ENDURE Research Project Title: **Amyloid beta truncated fragments: Relevance for Alzheimer's disease pathogenesis**

Alzheimer's disease (AD) is the most common form of dementia, which currently affects 5 million Americans. Amyloid beta (Abeta) is the main component of parenchymal plaques and vascular deposits, two of the major neuropathological lesions of AD. In addition to full-length Abeta species, biochemical and proteomic analysis of AD deposits reveal a high degree of Abeta heterogeneity at both N-and C-terminal ends, likely resulting from the local action of multiple proteolytic enzymes. Interestingly, many of these fragments -particularly those truncated at the C-terminus- are also normal components of cerebrospinal fluid and have biophysical properties supporting their association with brain clearance mechanisms. Conversely, very little is known about the role of N-terminally truncated fragments, which we postulate are contributors to the disease pathogenesis. To better understand their properties and evaluate their potential association with the brain lesions, we generated antibodies specifically recognizing N-terminal epitopes and performed biochemical and immunohistochemical analyses. The tendency of N-terminal truncated species to rapidly aggregate and fibrillize together with their topographic localization at the core of amyloid plaques in mouse transgenic models support the notion of their participation in the mechanism of amyloidogenesis.

SOUTH TEXAS ADVANCED RESEARCH TRAINING: UNDERGRADUATE PROGRAM (START-UP)

UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER, SAN ANTONIO
Principal Investigator: *Dr. Alan Frazer and Dr. David Morilak*
Partner Institutions: University of Texas, San Antonio; Lady of the Lake University; St. Mary's University; Trinity University; and University of the Incarnate Word

PROGRAM DESCRIPTION: The overall goal of our Program is to encourage and prepare junior and senior undergraduates from the San Antonio and South Texas Region to enter doctoral programs in neuroscience, to complete them successfully, and become well-trained and competitive neuroscientists. To accomplish this, a comprehensive program is proposed for students accepted into the program, involving extensive research experiences in the laboratories of successful neuroscientists, and opportunities to develop and improve their writing, speaking, and time management skills.

Students will be recruited into START-UP from five partner institutions in San Antonio, namely Our Lady of the Lake University, St. Mary's University, Trinity University, University of the Incarnate Word, and the University of Texas, San Antonio. Collectively these schools have 24,527 undergraduates who are URMs (based on ethnicity), of whom 2,947 are Science Majors. Also, these schools have a high number of students from low-income families, many of who are the first in their families to attend college. Faculty contacts have been established at each school to assist us in recruiting suitable students into START-UP. Thirty-one training faculty have been identified (including three from UTSA), who are appropriate to mentor these students in their laboratories. The students will participate in laboratory research for an average of 12 hours per week during the two academic semesters, and 40 hours/week during a 10-week intensive summer research exposure. Students will also have an opportunity to work in one of seven major neuroscience programs at institutions outside of San Antonio during the summer.

In addition to their laboratory research, the students will also attend seminars and journal clubs, research retreats, and have exposure to neuroscientists from other institutions. The students will all receive instruction on the responsible conduct of research. The Co-Directors of the Program are Drs. Alan Frazer and David Morilak, experienced scientists and administrators, who have run programs similar to START- UP previously. They will be members of an Executive Committee that will oversee all aspects of the Program. There is a formal evaluation plan for the Program, as well as an outcomes assessment process. Further, a plan is described to disseminate nationally all materials developed for the design and implementation of START-UP.

ADDITIONAL PROGRAM TEAM MEMBERSMEMBERS:

Dr. Timothy Raabe – St. Mary's University Dr. James Hall – Our Lady of the Lake University
Dr. James Roberts – Trinity University Dr. Cristy MacKinnon – University of the Incarnate Word
Dr. Edwin Barea-Rodriguez – University of Texas San Antonio

ENDURE TRAINEE ABSTRACT

DIEGO ESCOBAR-GARCIA

Home Institution and State: **St. Mary's University, University of Texas, Health Science Center**
Email: **descobar@mail.stmarytx.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **May 2015**
Mentors/Advisors at Home Institution: **James Lechleiter, Ph.D and Ramaswamy Sharma, Ph.D.**

ENDURE Trainee Scientific Interest:

I am interested in neurodegenerative diseases at the cellular level and the mechanisms behind them. I am also interested in the development of the nervous system; including mutations that lead to defective formation of ordinary neural functions. I am also interested in the brain-machine interface.

ENDURE Trainee Career Goals and Plan:

I will be pursuing a master's degree after undergraduate as well as obtaining clinical hours to supplement my laboratory experience. This will make me a more competitive candidate to apply to an MD/PhD program in the United States.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Benjamin Wolozin, Ph.D. and Katherine Youmans, Ph.D.**

ENDURE Research Project Title: **G3BP and Neurodegeneration**

This summer project focused on understanding the role of Ras GTPase Activating Protein Binding Protein-1 (G3BP1; an RBP that nucleates SG assembly) and its role in neurodegeneration. To determine the effects of pathological tau accumulation on RBP solubility in vivo, the age-dependent changes in G3BP1 and other nucleating SGs in two mouse models of AD were analyzed. In addition, preliminary results from our lab indicate that overexpression of G3BP1 decreases the levels of tau RNA in transfected cell lines. Thus, lentiviral shRNA constructs targeting murine G3BP1 were developed to determine whether knockdown of G3BP1 could rescue its effect on tau RNA. With our findings, particularly the knock down experiment of G3BP we hope to further our understanding of the role it plays in neurodegeneration.

ENDURE TRAINEE ABSTRACT

ERIC FLORES

Home Institution and State: **University of Texas Health Science Center, San Antonio, Texas**
Email: **eflores524@gmail.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Chemical Biology, December 2015**
Mentors/Advisors at Home Institution: **Dr. Kenneth Hargreaves**

ENDURE Trainee Scientific Interest:

Chronic pain management is a major health care problem due to an incomplete understanding of molecular mechanisms involved in the transition to persistent/chronic pain states. Nerve growth factor (NGF) is elevated in several chronic pain conditions and is a sufficient stimulus in humans to trigger a persistent pain state after a single injection. As a result, our group has developed a rat model of NGF-induced persistent allodynia (a reduced pain threshold) in which systemic NGF administration causes persistent reductions in hind paw thermal and mechanical thresholds. Moreover, the transient receptor potential channel subtypes V1 (TRPV1) and A1 (TRPA1) have been shown to mediate NGF-induced thermal and mechanical allodynia. Due to this feature of TRPV1 and TRPA1, further understanding of the molecular mechanisms behind increased TRPV1 and TRPA1 activity in inflammatory pain conditions is a worthy area of research and is the focus of the trainee supported by the ENDURE program.

ENDURE Trainee Career Goals and Plan:

After graduating with a degree in Chemical Biology from Our Lady of the Lake University in December of 2015, the trainee plans to apply to a DDS/PhD program in order to eventually become a clinician-scientist.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Texas Health Science Center, San Antonio**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Kenneth Hargreaves**

ENDURE Research Project Title: **Nerve Growth Factor Treatment Increases Growth Factor Treatment Increase Nocifensive Behavior Evoked by Mustard Oil Injection to Rat Hind Paws**

Chronic pain management is a major pharmacological problem due to an incomplete understanding of mechanisms involved in the transition to persistent pain. Nerve growth factor (NGF) is elevated

in several chronic pain conditions and a single NGF injection is sufficient to trigger persistent pain in humans. Our group developed a rat model of NGF-induced persistent allodynia (a reduced pain threshold) in which systemic NGF administration causes persistent reductions in hind paw thermal and mechanical thresholds. Moreover, we demonstrated that transient receptor potential channel vanilloid 1 (TRPV1) mediates NGF-induced persistent thermal and mechanical allodynia. Transient receptor potential ankyrin 1 (TRPA1) is expressed solely in TRPV1-positive neurons, so TRPA1 may mediate persistent effects of NGF as well. A blinded observer measured nocifensive (pain-like) behavior evoked by hind paw injection of increasing concentrations of mustard oil (0.001% - 10%), a TRPA1 agonist to naïve rats. Hind paw nocifensive responses were defined as licking, lifting, or flinching the hind paw. Comparison of mustard oil dose responses between naïve animals and NGF-treated animals will identify whether TRPA1 activity is persistently increased after NGF treatment.

ENDURE TRAINEE ABSTRACT

GERALDO MEDRANO

Home Institution and State: **St. Mary's University, TX**
Email: **gmedrano@mail.stmarytx.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology, May 2015**
Mentors/Advisors at Home Institution: **Dr. Tim Raabe**

ENDURE Trainee Scientific Interest:

The ENDURE Program has provided me with the opportunity to do research in the field of neuroscience. I have always been interested in finding out how different substances we intake affect our nervous system and overall health. I am also interested in the physiology involved with our central nervous system and the different neurotransmitters involved in controlling and regulating our everyday actions. From the fruits we eat, to the substances that claim to benefit cognition, I would like to research what different molecules benefit people the most and also know which are harmful. I would like to explore different fields in order to learn about different areas of science. The more there is to learn the better.

ENDURE Trainee Career Goals and Plan:

I plan on pursuing a PhD in the field of neuroscience/neurobiology. I want a career that is built around my passion to discover new ideas and improve the health of people around the world through the understanding of interactions and reactions of substances with our biological systems. I hope to discover and advance the research on substances that can help enhance and maintain good health.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Texas Health Science Center San Antonio**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Benjamin Eaton**

ENDURE Research Project Title: **Activation of TRP Channels underlie chemotherapy-induced peripheral neuropathy**

A clinically relevant side effect of anti-cancer drugs is the generation of a peripheral pain syndrome referred to as chemotherapy-induced peripheral neuropathy (CIPN). CIPN limits the dosage of anticancer drugs, compromising anti-cancer treatments. No effective treatments for CIPN exist and little is known about how anti-cancer drugs generate peripheral neuropathy. To elucidate the

cellular mechanisms underlying CIPN, we have created a novel model in Drosophila to elucidate the molecular and cellular mechanisms of CIPN. We find that feeding the anti-cancer drug vinblastine to Drosophila larvae rapidly generates a robust mechanical allodynia. In patch-clamp experiments, we observe that vinblastine rapidly depolarizes mechanosensory neurons resulting inappropriate neuronal activity, suggesting that vinblastine is activating an ion channel(s) on the surface of sensory neurons resulting in pain. In support, mutations in the Drosophila TRP channel genes TrpA1 and painless both suppress the effect of vinblastine on mechanical nociception. TrpA1 and Painless are important mediators of thermo- and mechano-sensation, respectively. Because TrpA1 is not normally involved in mechanical nociception; our data suggest the model that vinblastine can broadly activate the family TRP channels. These results suggest that inhibitors of TRP channels activity may represent a novel class of analgesics for CIPN.

ENDURE TRAINEE ABSTRACT

JUAN MORALES

Home Institution and State: **UT Health Science Center, San Antonio TX**
Email: **Juanmorales790@gmail.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Biology, July 2015**
Mentors/Advisors at Home Institution: **Dr. Jason O'Connor**

ENDURE Trainee Scientific Interest:

I am interested in the correlations between mental disabilities and physical neural damage. I would focus on research methods and techniques that can help improve individuals' lives that have gone through physical brain damage.

ENDURE Trainee Career Goals and Plan:

My goals are to improve the lives of individuals with physical and mental disabilities either through research or by becoming a surgeon.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **UT Health Science Center- San Antonio**

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title: **Prefrontal Cortical-Mediated Behavior is Impaired in Kynurenine Monooxygenase Knockout Mice**

Reduced kynurenine monooxygenase (KMO) expression and activity has been measured in post mortem prefrontal cortex (PFC) tissue samples of patients with schizophrenia, and a single nucleotide polymorphism in the KMO gene has been linked with reduced enzyme function and increased psychosis in schizophrenia and bipolar disorder. We used mice with a genetic deletion of the KMO gene, or C57BL6 controls, to explore the functional consequences associated with loss of KMO function. As expected, KMO-/- mice exhibit a significant elevation in endogenous kynurenine and kynurenic acid levels relative to control mice. When recognition memory was tested using the novel object recognition task, KMO-/- mice performed similar to control mice. However, KMO-/- mice required significantly more trials to reach criterion during the intradimensional reversal stages of the attentional set shifting task (AST), while performance at the extradimensional shift was similar between groups. Because the PFC is the critical brain region that mediates performance on the AST, KMO-/- or control mice were tested in the Go/No-Go task. KMO-/- mice exhibited a delay

in learning to press a lever for a reward in response to the "Go" signal; however, all mice eventually reached stable responding rates greater than 80%. When mice were required to withhold responding following the "No-Go" signal in order to obtain the reward, response inhibition was impaired in KMO-/- mice compared to controls. Together, these data indicate that PFC-mediated behavior is disrupted in KMO-/- mice, and these novel transgenic mice may provide a useful preclinical tool to explore the pathogenic mechanisms underlying genetic KMO deficiency.

ENDURE TRAINEE ABSTRACT

ALICIA SANCHEZ

Home Institution and State: **St. Mary's University, Texas**
Email: **asanchez53@mail.stmarytx.edu**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology, Mathematics, May 2015**
Mentors/Advisors at Home Institution: **Dr. Timothy Raabe**

ENDURE Trainee Scientific Interest:

To gain experience by learning to perform basic pharmacology laboratory assay techniques and behavior testing approaches while assisting my mentor, Dr. Gould, in her studies of the mechanisms underlying social behavior impairments that are characteristic of autism, schizophrenia, and other disorders.

ENDURE Trainee Career Goals and Plan:

I hope to attend medical school and complete a medical-scientist training program. My fields of interests are pediatric neurology, neuroscience, and biomedical engineering. After finishing these programs and any additional training (either post-doctoral or residency) I intend to work in the field of translational medicine and to develop improved treatment options for patients.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **The University of Texas Health Science Center at San Antonio**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Georgianna Gould (Physiology) and Dr. Jannine Cody (Pediatrics)**

ENDURE Research Project Title: **Impact of Neto1 deficiency on murine sociability preferences**

Deletions of chromosome 18q (18q-) produce a range of physical hallmarks and behavioral impairments. Specific genes on 18q have been identified as dosage sensitive, and are linked to behavioral deficits when hemizygous. Among the behavioral deficits common in people with 18q- are impairments in executive function, specifically cognitive flexibility and social behavior impairments that resemble autism spectrum disorders. A candidate causative gene on 18q is neuropilin (NRP) and tolloid (TLL)-like 1 or NETO1. Neto1 knock-out mice exhibit cognitive deficits and disrupted long-term potentiation in the hippocampus that are correctable by ampakine treatment. Therefore, we have initiated studies to characterize the relationship of Neto1 to social

behaviors. We will employ three chamber sociability tests to assess their behavior, since we have validated that wild-type mice (the C57BL/6 background strain) normally exhibit a significant preference ($p < 0.05$, N=8) for social interaction.

ENDURE TRAINEE ABSTRACT

ARNULFO TUNON

Home Institution and State: **Texas**
Email: **atunon@trinity.edu**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Neuroscience, May 2016**
Mentors/Advisors at Home Institution: **James Roberts Ph.D., and Jason O'Connor Ph.D.**

ENDURE Trainee Scientific Interest:

I'm very interested in neurotechnology; the application of technological innovations to our understanding of neuroscience. However, I have yet to develop a particular specific interest in that area. I'd like to continue exploring potential ways in which we can use technology to improve the human condition by lessening suffering.

ENDURE Trainee Career Goals and Plan:

I plan to go to graduate school and aim for a PhD in Neuroscience to enter the academic field of research technologies. To prepare, I will continue working in research labs that center around neuroprosthetics and targeted stimulation.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Texas Health Science Center at San Antonio**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Jason O'Connor, Ph.D.**

ENDURE Research Project Title: **Assessment of peripheral immune parameters as non-invasive measure of VNS efficacy: A pilot study**

Inflammation can be an acute method of fighting infections but excessive inflammation damages surrounding tissue and is characteristic of immune diseases. As a possible treatment, Vagus Nerve Stimulation is known to affect the cholinergic anti-inflammatory pathway, which inhibits immune response through reducing cytokine production. It functions through artificial stimulation of the vagus nerve, which branches to multiple organs and is involved in autonomic motor functions, such as pupil dilation and heartbeat regulation. Furthermore, it releases acetylcholine, a neurotransmitter involved in peripheral immune response suppression, as activated via an external device surgically implanted. Due to this, a whole-blood bioassay is explored as a possible alternative to the existing invasive methods of measuring VNS efficacy. Using two VNS settings and

a control, blood samples were collected from the tails of eighteen rats with the baseline established two hours before stimulation. Blood smears were collected at specified time points and stained for white blood cells, which were then categorized into neutrophils, lymphocytes, monocytes, or other (eosinophils and basophils) based off a total cell count of 100. Despite the observed variation between white blood cell types, the small sample size limited the ability to determine if an ex vivo whole-blood assay represents the observed in vivo immune suppression.

NEUROSCIENCE RESEARCH OPPORTUNITIES TO INCREASE DIVERSITY (NeuroID)

UNIVERSITY OF PUERTO RICO RIO PIEDRAS
Principal Investigator: *Dr. Jose Garcia-Arraras*
Partner Institutions: Inter-American University of Puerto Rico, Bayamon Campus and Universidad el Este

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 MEMBERSMEMBERS:

Dr. Coral Cintron – Program Administrator, University of Puerto Rico – Rio Piedras
Dr. Lilliam Lizardi - Universidad del Este, SUAGM
Dr. Karen Gonzalez - Universidad Metropolitana, SUAGM
Dr. Armando Rodríguez - Interamerican University — Bayamón

ENDURE TRAINEE ABSTRACT

MONICA A. LEFEBRE RIVERA

Home Institution and State: **Inter American University of Puerto Rico, Bayamon Campus**
Email: **monitkd@me.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Biotechnology, 2016**
Mentors/Advisors at Home Institution: **Dr. Jose E. Garcia Arraras, University of Puerto Rico Rio Piedras Campus**

ENDURE Trainee Scientific Interest:

Due to recent events my interests have focused on the area of neuroscience and cellular molecular neurobiology. I've developed a desire to learn about the inner workings of the nervous system, the diseases that affect its function and the possibility of a cure by regeneration of tissue and neuroplasticity. This interest is what propelled me to apply for the NeuroID program.

ENDURE Trainee Career Goals and Plan:

For my short term goals I am planning to participate in summer research internships this upcoming year. After finishing my undergraduate studies I plan to continue my education by enrolling in a graduate program and completing either a PhD or an MD-PhD. I would like to focus in the areas of neuroscience, cellular molecular neurobiology or chemical biology. As for my long term goals I see myself continuing my research focusing on biomedical applications to improve the human condition. I would also like to participate in teaching and mentoring the next generation of scientists and sharing the knowledge I have accumulated over the years.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Jose E. Garcia Arraras, University of Puerto Rico Rio Piedras Campus**

ENDURE Research Project Title: **Characterization of Neuronal and Neuroendocrine Cell in the Luminal Epithelium of Holothuria Glaberrima**

Echinodermata is an ancient phylum of marine animals that, due to their diversification, during the Lower Cambrian Period exist in a variety of body forms. Even though this complexity exists, they appear to have one thing in common, their nerve plexus. It is proposed that the nervous system in the echinoderms possess a neuroendocrine extension and that this system plays an important role

in feeding, locomotion and regeneration. Immunohistological techniques will be used to identify the neuroendocrine cells in the 4 digestive tract regions: the esophagus, the descending small intestine, ascending small intestine, and the large intestine. In particular, the antibodies RN1 and anti-GFS will be used to observe, describe and quantify the neuroendocrine cells. The results obtained through these studies will provide important information on echinoderm anatomy, nervous system connectivity, and for future studies of cellular differentiation during intestinal regeneration.

ENDURE TRAINEE ABSTRACT

CLAUDIA LOPEZ

Home Institution and State: **University of Puerto Rico, Rio Piedras Campus**
Email: **clopezlloreda@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Cellular-Molecular Biology, May 2015**
Mentors/Advisors at Home Institution: **Dr. Jose E. Garcia-Arraras**

ENDURE Trainee Scientific Interest:

One of my interests in the study of neuroscience is the application of stem cell therapies to the treatment of neurodegenerative disorders. I am interested in the study of the molecular mechanisms that underlie neurodegenerative diseases. This study along with the study of stem cells can lead to the possible development of new cell-based therapies for neurodegenerative conditions. Another interest, in which I have done research, lies in the study of two very similar processes: development and regeneration. These processes demonstrate how complex the development of an organism can be and how difficult it can be to elucidate the mechanisms that take place to make it occur. Specifically, I am interested in understanding how neurogenesis occurs throughout development and at the same time how organisms can regenerate after a lesion to their central nervous system.

ENDURE Trainee Career Goals and Plan:

My goals are to graduate with a Bachelor's degree in Cellular-Molecular Biology with a strong background in Psychology and Neuroscience. After achieving this, I would like to obtain a Ph.D. in Neuroscience and pursue a career as a researcher in the area, with the ultimate goal of obtaining a research position in an academic or research institution. Regarding research, I plan on continuing to work in the area of developmental neurobiology or neurodegenerative diseases. I would like to be part of associations related to Neuroscience because I believe it is necessary to integrate newfound knowledge into the context of the society we live in. Through my academic and non-academic efforts, I wish to contribute beneficially to the area of Neuroscience not only by carrying out important research, but also by bettering the treatment of neurodegenerative diseases.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Jonathan A. Raper**

ENDURE Research Project Title: **Temporal and spatial analysis of neuronal fiber subpopulations in the regenerating radial nerve cord of the sea cucumber Holothuria glaberrima**

Our lab studies the process of regeneration in the CNS of the sea cucumber Holothuria glaberrima. We have previously shown that three commercial antibodies identify distinct fiber subpopulations within H. glaberrima CNS. Our objective was to characterize the temporal and spatial regeneration patterns of these distinct subpopulations following transection of the holothurian CNS. One of the five radial nerve cords (RNC) of the sea cucumber was transected with a scalpel and left to recover. Animals were sacrificed at different days post-injury (dpi): 2, 6, 12, 21, and 28 dpi. Using immunohistochemistry, the fiber subpopulations were labeled with anti-Pax6, anti-Nurr1, and anti-PH3 and analyzed. At 2 dpi, anti-Pax6 showed high expression in the cut ends of the RNC at the injury site. Anti-PH3 expression showed little changes during the first two weeks of regeneration, but appeared to be more prominent at the injury site in 21 dpi animals. Anti-Nurr1 labeled a distinct fiber population in the RNC whose expression appears to decrease at 21 dpi. The results suggest that the fiber population differs in their regeneration profile. These results provide insight into the spatial and temporal patterns of CNS regeneration that might help understand the regenerative capacities of these organisms.

ENDURE TRAINEE ABSTRACT

MARLIAN MONTESINOS CARTAGENA

Home Institution and State: **Universidad de Puerto Rico, Rio Piedras Campus**
Email: **mmarli_16@yahoo.com**
Undergraduate Academic Level: **Junior (Third year)**
Undergraduate Major and Expected Graduation Date: **Biology, May 2015**

ENDURE Trainee Scientific Interest:

My research interests point towards the neuroscience field. I am particularly interested in studying behavior using an animal model. In my current research we study learning and memory, areas that greatly form part of my interests for future research. Also, it calls my attention to how genetic modifications can alter behavior.

ENDURE Trainee Career Goals and Plan:

My short-term goals include acquiring research experience in Universidad de Puerto Rico as well as in the United States to expose myself to the environment of a career in academia. I plan to take a neuroscience graduate course so I can see what graduate school would be like. Also I am looking forward to being able to share my experimental results at symposiums and in publications. As for long-term goals, I plan on entering in a neuroscience PhD program to eventually become a research professor.

ENDURE Trainee Summer Research Experience:

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

ENDURE Research Project Title: **Infralimbic cortex inactivation impairs extinction of avoidance: subsequent BNDF infusion rescues avoidance extinction**

Avoidance is a core symptom of all anxiety disorders, and is commonly resistant to behavioral extinction. Decreased activity in ventromedial prefrontal cortex (vmPFC) has been linked to poor extinction retention in anxiety patients. In rodents, deficits in infralimbic cortex (IL, vmPFC homolog)) functionality results in extinction failure as well. We therefore developed a rat model of avoidance persistence by pharmacologically inactivating IL prior to avoidance extinction training. We found that rats were able to acquire within-session extinction, but were not able to retrieve extinction memory subsequently, even after drug-free training. Thus, IL inactivation prior to avoidance extinction training induces avoidance persistence, which serves as a model of pathological avoidance. Because intra-IL infusion of BDNF enhances fear extinction, we tested whether it could rescue avoidance extinction retrieval. Indeed, intra-IL BDNF reduced both avoidance and freezing spontaneously, suggesting that BDNF enhances extinction generally. Future trials will determine whether upregulation of BDNF in vmPFC may alleviate persistent avoidance in

anxiety-prone patients.

ENDURE TRAINEE ABSTRACT

ALAN MONTIEL

Home Institution and State: **University of Puerto Rico, Rio Piedras Campus**
Email: **alan.montiel93@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Molecular Biology, 2016**

ENDURE Trainee Scientific Interest:

By working with cocaine addiction in Dr. Carlos Jimenez's laboratory at the University of Puerto Rico Medical Sciences Campus and having family members who are addicted to certain drugs, I am interested in continuing research on the neurophysiological aspects of addiction. Understanding the neuronal mechanisms of addiction and finding a way to reverse or prevent the neuroadaptations that are induced by it motivates me to pursue a career in research.

ENDURE Trainee Career Goals and Plan:

I am preparing my future one step ahead to make sure that I fulfill my goals. My short-term goals include: getting accepted in a summer research internship program, graduating with honors and publishing a paper during my undergraduate education. Accomplishing these goals will aid in attaining my long-term goals of getting a PhD degree in neuroscience, improving medical technologies and impacting the science community with new discoveries on drug abuse and addiction.

ENDURE Trainee Summer Research Experience:

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

ENDURE Research Project Title: **PKMZ Role in Cocaine Sensitization**

Cocaine administration can cause compulsive patterns of drug use. This conduct is caused by a pathological learning process that induces neuroadaptations in the mesocorticolimbic system. These plasticities are caused by a raise in long-term potentiation (LTP) –responsible for the creation of a "memory" that affects their normal functioning. We investigate if the protein PKMζ –involved in maintaining LTP- has a role in these cocaine-induced changes. We use electrophysiology techniques with brain slices to measure AMPA post-synaptic currents of Ventral Tegmental Area (VTA) dopamine cells (DA) 24 hours after 5 days of 15mg/kg of cocaine or saline injections; and, we study locomotion activity of sensitized rats. We observed with electrophysiology that 5µM ZIP superfusion decreased AMPA currents in sensitized rats. Although, in vivo ZIP microinfusions via

cannula into the VTA after cocaine sensitization decreased locomotor activity only if ZIP was given 24 hours after the last day of cocaine administration. Finally, ZIP microinfusion into the Nucleus Accumbens (Nacc) decreased locomotor sensitization only if it was given on last two days of a 7-day withdrawal treatment. Our results imply that the cocaine induced changes are due to a pathological learning process which can be reversed and can annul the pathological response.

ENDURE TRAINEE ABSTRACT

STEPHANIE ORTIZ DOMENECH

Home Institution and State: **University of Puerto Rico, Rio Piedras Campus**
Email: **Stephanie.ortiz.152@gmail.com**
Undergraduate Academic Level: **B.A.**
Undergraduate Major and Expected Graduation Date: **December, 2014**

ENDURE Trainee Scientific Interest:

Within the field of psychology I have an interest in neuroscience and Cognitive Psychology. What I'm interested in neuroscience is to develop a diverse set of approaches to studying the biological basis of mental phenomena and clinical disorders. I would like to use functional neuroimaging including PET and fMRI for studies of decision-making, attention, and memory, and EEG studies. As for my interest in Cognitive Psychology, what interests me most about this approach is research in perception, human learning and memory, consciousness, thinking and problem solving, language, and intelligence, studies of sensation and perception, social cognition, moral decision making, and neurological disorders, as well as applications of this basic research to everyday settings. Also, an important aspect of Cognitive Psychology is the use of computer-based behavioral tests and web-based surveys to assess functional patterns in behavior, as well as functional neuroimaging techniques to study the neural bases of various components of cognition and behavior.

ENDURE Trainee Career Goals and Plan:

As a college student I always take into consideration the importance of work, responsibility and dedication in achieving my goals. I always have in mind my long-term goals without forgetting that there are some very important steps I must follow first. For example, in my short-term goals, I am working to complete my Bachelor in Psychology from the University of Puerto Rico, Rio Piedras Campus. Besides qualifications, it is important to participate in research programs and internships that allow me to gain experience in research. Finally, I want to finish my research of the relationship between obsessive beliefs and obsessive compulsive disorder in order to provide more information about this disorder to the Puerto Rican scientific community. In the long term I want to continue my graduate studies in psychology with a focus in Behavioral Neuroscience and Cognitive Psychology. Also, as a future Ph.D. student in Neuroscience, I want to integrate knowledge both in the cognitive area and in related disciplines, such as computer science, linguistics, philosophy, and statistics.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Laurence Coutellier**

ENDURE Research Project Title: **Meta Analysis of Latino Adolescents in Treatment**

There is a large body of evidence that supports the efficacy and effectiveness of psychological treatments for mental health conditions. However, ethnic and language minorities have not been part of these efficacy studies. Because of the lack of inclusion of diverse populations in efficacy trials, it is not at all clear the degree to which EBTs are beneficial or even appropriate for these groups. Aims: The purpose of the study is to identify and collect all efficacy and effectiveness studies that evaluate outcomes of psychological treatments for mental health conditions in Latino populations. Another purpose is to compare the relative effects of different types of treatments (behavioral, interpersonal, cognitive, etc.) to determine which treatment is more beneficial for Latinos. Method: We will use the integration of research through statistical analysis of the analyses of relevant effectiveness studies of treatments with Latinos. To carry out this study we are going to include published and published articles, with at least 40% of Latinos in the sample, all treatments for mental illness, emotional distress, family problems, and behavior problems. Also, we will include those studies that provide quantitative data regarding client's experiences in mental health treatments that explicitly report on client culture, ethnicity, or race. For the statistical analysis we will calculate the effect and then compare the effect size for conditions such as anxiety and depression from the studies with Latinos to the effect size reported from the non-minority studies on these conditions.

ENDURE TRAINEE ABSTRACT

YVIS DEL MAR ORTIZ-VELEZ

Home Institution and State: **Inter-American University of Puerto Rico**
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Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Forensic Science, May 2016**
Mentors/Advisors at Home Institution: **Dr. Irving Vega, Dr. Garcia Arrarás, and Dr. Perez Berenguer**

ENDURE Trainee Scientific Interest:

I want to apply my knowledge in Forensic Science to answer neurobiological questions. The combination of both fields opens the possibility of new areas of research and complementary areas, such as behavioral neuroscience and the justice system. Forensic neuroscience contributions in medical-legal and criminal cases provide a scientific assessment of factors involved in criminal or deviant behavior. The idea of applying what we know about the brain to the study of a victim and victimizers in a social, behavioral (fear, memory), and molecular aspects (traumatic brain injury, spinal cord injury) is my main research interest.

ENDURE Trainee Career Goals and Plan:

The opportunity to be part of a research lab in Puerto Rico, and a summer research program experience in the United States helped me to decide what I want for my future. My short-term career goals are to complete my bachelor's degree and acquire research skills. Then, I will pursue a dual graduate degree in neuroscience and neurology or pathology. After that, I wish to attain an academic position and collaborate with the Criminal Justice System to understand criminal behavior.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Northwestern University, Chicago, Illinois**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. John Disterhoft, and Dr. Savio Chang**

ENDURE Research Project Title: **TBI induces AD-like pathologies in wild-type mice and exacerbates histological phenotypes in a transgenic AD model**

Traumatic brain injury (TBI) results from a force transmitted to the head that leads to a collision between the brain and skull that may result in impairment of normal brain function. We hypothesize that TBI and Alzheimer's disease (AD) share common pathways that lead to neuronal dysfunction, and the goal of this study is to characterize the convergence of TBI and AD at the

cellular level. We compared the cellular changes induced by TBI in mice that received a pressurized air blast to the skull to naive controls. We have two important sources of data to evaluate the effects of TBI in our mice: memory function and the quantification of AD biomarkers such as Aβ and tau. The behavioral analysis of fear conditioning done following TBI and in sham control mice suggests that the control animals retained the memory of the context in which they were shocked better and for longer than the blasted animals. Immunohistochemistry for Aβ and P-tau did not reveal a detectable increase in these AD biomarkers. Our behavioral data suggests that TBI alters hippocampal function at 1 month post-blast but does not induce hallmarks of neurodegeneration at this time point.

ENDURE TRAINEE ABSTRACT

ROSANNA PAGAN-ALEMAN

Home Institution and State: **University of Puerto Rico, Rio Piedras Campus**
Email: **rosanna.pagan@hotmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology, May 2015**
Mentors/Advisors at Home Institution: **Dr. Mark Miller**

ENDURE Trainee Scientific Interest:

I am greatly interested in researching the biological and molecular aspects underlying psychopathology and addiction, neural systems of memory and learning, brain injury, neuropsychology and functioning of the invertebrate nervous system. I would like to understand how certain genes might be involved in the development of psychopathology or addiction; how a specific brain injury could interfere in higher functions and understand the neurobiology underlying that; the role of the neurochemistry of neurotransmitters in psychopathologies and behavior; and the relationship of neuroanatomical regions of the brain and behavior.

ENDURE Trainee Career Goals and Plan:

I plan to pursue Ph.D. in Clinical Psychology with postdoctoral studies in Neuropsychology and Psychiatry. I ultimately desire a career as a clinical neuropsychologist and researcher in a medical setting.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Daniel Tranel and Dr. Erik Asp**

ENDURE Research Project Title: **Localization of FMRFamide-like immunoreativity in the nervous system of Biomphalaria glabrata, an intermediate host for schistosomiasis**

It is estimated that approximately 10% of people worldwide live at risk of the parasitic disease schistosomiasis, or "snail fever". The digenetic trematode worm Schistosoma mansoni that causes the form of schistosomiasis found in the Western Hemisphere employs the freshwater snail Biomphalaria glabrata as its primary intermediate host. As infection of snail hosts by larval trematodes has been reported to alter the expression of genes that encode precursors of molluscan neuropeptides belonging the FMRFamide family (Hoek et al. 1997), this investigation examined the

localization of FMRFamide-like immunoreactivity (FMRFa-li) in the central nervous system (CNS) and peripheral nervous system (PNS) of B. glabrata. Within the CNS, FMRFa-li neurons were mainly located in the cerebral ganglion (Cer. g.; 34 ± 7), pedal ganglia (Pd. g.; 36 ± 10), left parietal ganglion (L Pa. g.; 18 ± 11) and visceral ganglion (V g.; 13 ± 3). While no FMRFa-li neurons were observed in the buccal ganglion, the buccal neuropil contained branching fibers that originated from axons in the cerebral-buccal connective. In the periphery, structures associated with the male reproductive system (penis muscle and sheath) were richly innervated by FMRFa-li fibers. Double-labeling experiments (biocytin backfill x FMRFa-li) of the penis nerve demonstrated that the neurons projecting to male reproductive structures were located in the ventral lobe (VL) of the Cer. g. It is suggested that parasite-induced changes in this peptidergic system could contribute to modifications of feeding and reproductive behaviors that have been reported in infected snails.

ENDURE TRAINEE ABSTRACT

PABLO A. PAGAN-RIVERA

Home Institution and State: **Universidad del Sagrado Corazon, San Juan, PR**
Email: **pabloabner21@gmail.com**
Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Psychology, June 2015**
Mentors/Advisors at Home Institution: **Dr. Gregory J. Quirk, Principal Investigator and Dr. Maria Diehl, Mentor**

ENDURE Trainee Scientific Interest:

It intrigues me how the same biological brain that controls our body to survive is also an emotional box of memories that has a great influence on our mental health and wellbeing. It fascinates me the way it shapes who we are, what we do, how we think, and who we become. Also, understanding how social factors can influence and change the brain interests me in a unique way. That's why my research interests revolve around neural systems related to emotion regulation, anxiety disorders, stress, decision-making, learning and memory.

ENDURE Trainee Career Goals and Plan:

Among my short-term academic goals I want to master as many personal and scientific skills as I can and develop the discipline necessary to become a successful scientist. After that, my primary goal is to apply to a competitive neuroscience graduate program in the States to complete a Ph.D. Through this path, I plan to accomplish my long-term academic career goals that consist of teaching while conducting research and ultimately getting tenure in an academic department. As a future academician, my main drive will be to stimulate scientific thinking and promote research in minority groups and students with few opportunities.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title: **Neuronal activity in prelimbic cortex correlates with expression of active avoidance.**

We recently reported that muscimol inactivation of the prelimbic prefrontal cortex (PL) impairs platform-mediated avoidance, in which rats avoid a tone-signaled footshock by stepping onto a

nearby platform (Bravo-Rivera et al., 2014). In the current study, we used single-unit recording to determine if PL neurons are responsive to the tone, platform approach, or both, in rats trained in platform-mediated avoidance. A total of 440 PL neurons were analyzed. Neurons were classified as tone-responsive (TR cells) if their firing rate in the first 3-second bin following tone onset differed significantly from baseline (-2.58> Z >2.58). We found that 23% of PL neurons exhibited tone responses, which is comparable to fear conditioning (25%, Burgos-Robles et al., 2009; Sotres-Bayon et al., 2012). Interestingly, avoidance was associated with a higher percentage of inhibitory TR cells than fear conditioning (19% vs. 5%). We next examined neural correlates of platform approach, which typically occurred within 10s of tone onset, and to a lesser extent in the absence of the tone. PL neurons were classified as approach responsive if their firing rate increased or decreased within 3 seconds prior to platform mounting (-3.00> Z >3.00). Using this criterion, 38% of PL neurons signaled platform approach, which was significantly higher than in an unconditioned control group (13%, Fisher Exact, $p<0.05$), suggesting that PL activity reflects avoidance behavior. Cells responded to platform only (15%), tone only (8%), or both (23%). Platform approach responses were more often excitatory than inhibitory (39% vs. 16%, $p<0.01$). Most cells that responded to the tone also responded to the approach (63%), and vice versa (61%). Together, our findings suggest that inhibitory tone responses in PL emerge with avoidance training and that inputs signaling the tone converge with inputs signaling platform approach. Future studies using an optogenetic approach will determine which of these PL correlates is necessary for expression platform-mediated avoidance.

ENDURE TRAINEE ABSTRACT

THIBAUT R. PARDO-GARCÍA

Home Institution and State: **University of Puerto Rico-Río Piedras campus, PR**
Email: **thi.pg@hotmail.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Cellular Molecular Biology, May 2016**
Mentors/Advisors at Home Institution: **Carmen S. Maldonado-Vlaar Ph.D. (Principal Investigator and Co-Program Director of ENDURE-NeuroID), Kariluz Davila-Díaz Ph.D., and Adaris Mas-Rivera Ph.D.**

ENDURE Trainee Scientific Interest:

My interests are in the field of Neuroscience, the brain and its complexity have captured my attention since I was 6 years old. Although I am open to any kind of training in neuroscience, my experiences thus far have turned my attention to neuropharmacology, neurophysiology, behavior and cognition, and neurological diseases such as drug addiction.

ENDURE Trainee Career Goals and Plan:

My goals after finishing my BS degree include entering a respectable university, obtaining an MD/PhD and aspiring to be one of the best. I believe that without scientists there wouldn't be medical doctors, because scientific research is the foundation of all knowledge acquired and applied in medicine. With my scientific and medical experience I want to provide benevolent service all over the globe. I wish to form a foundation for research on neurological diseases, make new discoveries and create new techniques for the benefit of science and people.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution:

ENDURE Research Project Title**: (1) Effects of a positive allosteric modulator of the metabotropic glutamate receptor 5 within the Nucleus Accumbens shell during environmental elicited cocaine conditioning. (2) Regulation of anxiety in the Nucleus Accumbens Shell through the modulation of the endocannabinoid system**

As a summer research experience I had the opportunity of performing two experiments, one from a co-worker, Karina Torres Tristani, as she was away in a summer program, and the beginning of my own. My co-workers experiment aimed to seek the therapeutic potential of other mGluR5 PAM novel compounds, as mGluR5 selective agonist CHPG (RS)-2-chloro-3-hydroxyphenylglycine, on

specific aspects of cocaine addiction such as conditioned locomotor response. Rats were bilaterally implanted with cannulas within NAc shell, and two different groups were exposed to an environment with different cues within activity chambers. Prior to placing the animals in the chambers, rats received systemic injections of saline or cocaine for 10 consecutive sessions. On the day of the conditioned response expression, different groups of rats were microinjected with the agonist CHPG into the NAc shell and then they were placed in the activity chambers. After gathering the results I went on to my Investigation. Here I want to characterise the role of the endocanabinoid system in modulating emotion in the NAc shell through the interaction of co-localized CB1 and TRPV1, establish how important is this localisation for there to be an emotional modulation by the endocannabinoid system and finally, I will use this data in the reduction of anxiety-like-behaviour produced by amphetamine administration. To accomplish all this, the first step is characterising the NAc shells role in anxiety through the microinjection of N-Arachidonoyl-Serotonin into the NAc Shell of rats, through previously bilaterally implanted cannulas, and then they were tested in the elevated plus maze for stereotyped behavior. The data showed promising results for future projects related to this one.

ENDURE TRAINEE ABSTRACT

WILLIAM A. RAMOS-GUASP

Home Institution and State: **University of Puerto Rico, Rio Piedras Campus**
Email: **wrguasp@gmail.com**
Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Cellular and Molecular Biology, May 2016**
Mentors/Advisors at Home Institution: **Dr. Gregory J. Quirk**

ENDURE Trainee Scientific Interest:

My main research interest is to study the cellular and molecular basis underlying complex behavior in mammals. Specifically, I am interested in deciphering specific neural circuits and molecular pathways mediating cognitive and behavioral impairment in neurological disorders.

ENDURE Trainee Career Goals and Plan:

After I complete my baccalaureate studies at the University of Puerto Rico, my plans are to pursue graduate studies at a leading neuroscience research institution where I can get the experience and guidance needed to become a productive and independent scientist. My ultimate career goal is to establish my own neuroscience research lab in Puerto Rico where I can offer inspiring and competitive research opportunities to local students.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Irving E. Vega**

ENDURE Research Project Title: **Identification of potential protein partners of EFhd2**

Alzheimer's disease (AD) represents the sixth leading cause of death in the United States. Although there is no cure for the disease at the moment, previous studies have associated the molecular mechanisms leading to the development of the neurodegenerative-mediated dementia to the hyperphosphorylation of the microtubule-stabilizing tau protein. Recent studies have shown that EFhd2, a novel calcium-binding protein, is associated with pathological forms of tau in the tauopathy mouse model JNPL3, expressing the human tauP301L mutant, and in post-mortem brains of AD patients. However, the pathophysiological role of EFhd2 in tau-mediated neurodegeneration remains unknown. To address this question, we sought to identify potential protein partners of EFhd2, considering the importance of protein-protein interactions as mediators of cellular function and dysfunction. Using the phage-display technique, we showed that EFhd2

associates with proteins involved in events such as: transcriptional regulation, proteolysis, oxidative stress and cellular metabolism. Further studies will be needed to validate these interactions and further characterize the role of EFhd2 in tau-mediated neurodegeneration.

ENDURE TRAINEE ABSTRACT

LUZIVETTE ROBLES

Home Institution and State: **UPR Río Piedras Puerto Rico**
Email: **luzivetterobles@yahoo.com**
Undergraduate Academic Level: Junior
Undergraduate Major and Expected Graduation Date: **Cellular and Molecular Biology, May 2016**
Mentors/Advisors at Home Institution: **Dra. Carmen S. Maldonado-Vlaar**

ENDURE Trainee Scientific Interest:

For all the advances made in neuroscience, relatively little is known about the brain. I want to be an agent of change, a part of this exciting, relatively new field of science and research, to be on the front line of innovation. My wish is to discover, produce, break new ground, and learn the secrets and inner workings of the human brain. The dynamic nature of research attracts me; I love working on different things each day and the engaging nature of scientific investigation. Also, working towards improving quality of life for people is rewarding and worthwhile. I am especially interested in research related to cognitive neuroscience and molecular biology. In addition, I have a very special interest in studying the relationship between music and the brain, how the brain interprets music and how music might influence the human nervous system.

ENDURE Trainee Career Goals and Plan:

Once I decided that I want to be a neuroscientist, I applied to the University of Puerto Rico: Río Piedras Campus. During my bachelor's degree I want to learn and experience as much as I can. I want to make the most out of my time studying and wish to maintain good grades. After I obtain my degree in cellular and molecular biology I will continue studying, eventually obtaining an M.D./Ph.D. After finishing my education, my goal is to work as a scientist doing research related to cognitive neuroscience and neurobiology. I am especially attracted to research concerned with perception and attention, sensory processing, memory and emotions. My wish is to work towards discovering more about how the brain functions during these processes and finding biological mechanisms underlying behavior. I would also like to investigate areas that look to connect cognitive and psychological questions with neurobiological answers.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **UPR Río Piedras**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Irving E. Vega**

ENDURE Research Project Title: **Treatment of SHSY-5Y cells with JNK and CDK5 inhibitor to**

elucidate the molecular mechanism of Taxol mediated degradation of SCG10

axol, or Paclitaxel, is a chemotherapeutic drug used to treat various types of cancer. Like all drugs, Taxol has side effects, one of which is causing damage to the nerves of the peripheral nervous system, a disorder called neuropathy. Taxol works by stabilizing microtubules, thus altering the dynamic instability necessary for cellular differentiation and intracellular transport. Microtubule-stabilizing and destabilizing proteins like Tau and SCG10, respectively, regulate this dynamic instability. However, the molecular mechanism through which Taxol causes neuropathy is still unknown. We know that Taxol treatment reduces the abundance of SCG10 in neuroblastoma cells. It is possible that Taxol mediated phosphorylation of SCG10 by kinases JNK or CDK5 could marks the protein for degradation. Inhibiting JNK on Taxol treated neuroblastoma cells did not produce a significant recovery of SCG10 protein level. However, inhibiting both JNK and CDK5 restored SCG10 protein levels. These results help elucidate the molecular mechanism of Taxol mediated SCG10 degradation protein reduction. Once the molecular mechanism through which SCG10 is degraded becomes clear, perhaps a successful treatment for neuropathy may be developed.

ENDURE TRAINEE ABSTRACT

JEAN C RODRIGUEZ DIAZ

Home Institution and State: **University of Puerto Rico Río Piedras Campus, PR**
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Undergraduate Academic Level: **Junior**
Undergraduate Major and Expected Graduation Date: **Biology, May 2017**
Mentors/Advisors at Home Institution: **Dr. J. Lasalde, Dr. J. Colon and Dr. L. Camara**

ENDURE Trainee Scientific Interest:

I have a great interest in different fields of science, particularly biology, chemistry and physics. I have great interest in molecular and cellular biology, as well as the biochemistry that keep cells alive. I am fascinated with how concepts from physics and chemistry serve to better understand the function of the nervous system and how bioengineering has been used to repair or substitute certain areas of an injured organ system. The interdisciplinary nature of the field of neuroscience is very appealing since it offers scientists the opportunity to study the nervous systems from many different perspectives. For this reason I have a great interest in neural engineering.

ENDURE Trainee Career Goals and Plan:

I am currently completing a bachelor's degree in Molecular and Cellular Biology. To complement my interest in bioengineering, I intend to complete a minor in physics and take several courses in chemistry and programming. I wish to apply to a graduate school program in the field of neuroscience. I desire to pursue a PhD or an MD PhD in the field of neural engineering. I plan on discovering new techniques and knowledge that may serve to better understand how the nervous system functions which may lead to the development of novel technologies that improve the quality of life for those suffering from some impediment due to disease or injury of the nervous system. I also wish to be a part of the training and instruction of future scientists as a mentor or professor.

ENDURE Trainee Summer Research Experience:

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

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. J. Lasalde and Dr. J. Colon**

ENDURE Research Project Title: **nAChR modulation by ibuprofen**

The project consisted of studying certain members of the neuronal nicotinic acetylcholine receptor family (nAChR) like the α7 nAChR, which has been linked to the inflammatory process, and α4β2 nAChR. The objective was to determine whether NSAID drugs like ibuprofen can affect the activity

of neuronal receptors like α7 nAChR and α4β2 nAChR. This was achieved by using Xenopus oocytes that were injected with mRNA coding for the α7 nAChR or α4β2 nAChR. The oocytes were incubated for a 48 hour period after injection to allow for protein expression. The functionality and the amplitude of the responses of the nAChRs were determined using two electrode voltage clamp (TEVC) technique on Xenopus oocytes. The amplitude of the responses in the presence and absence of ibuprofen was determined. In the presence of ibuprofen the amplitude of the α7 nAChR and α4β2 nAChR response were reduced, suggesting a possible role for ibuprofen in the modulation of these nAChRs. Further studies will be directed at determining the mechanism of action of ibuprofen and whether other members of the nAChRs family are also modulated by ibuprofen. Moreover other common drugs used to treat pain which are not NSAIDs, like acetaminophen and nalproxene will be tested to see if they are also able to modulate the function of neuronal nAChRs.

ENDURE TRAINEE ABSTRACT

CAROLINA SANTIAGO ROBLES

Home Institution and State: **University of the Sacred Heart, San Juan, Puerto Rico**
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Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Biology, 2016**
Mentors/Advisors at Home Institution: **Eduardo Rosa-Molinar**

ENDURE Trainee Scientific Interest:

Since June 2014, I am a research trainee of a Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Research Education Experiences (ENDURE), named NeuroID (Neuroscience Research Opportunities to Increase Diversity; neuroid.uprrp.edu). The research I'm involved in with Dr. Rosa-Molinar is directed to gaining insights and elucidating the connectomics of the vertebrate spinal cord of the Western Mosquitofish known as the Gambusia affinis. During the past months I've been working with specific connexins of gap junctions in the myelin surrounding the axons of motor neurons in the spinal cord. I have used techniques such as cutting sections with sliding microtomes, immunohistochemistry (IHC), confocal microscopy, and epi-fluorescence microscopy. These techniques are helping to address research questions in order to provide useful and valid information in the quest to understand certain problems such as myelin degeneration.

ENDURE Trainee Career Goals and Plan:

The opportunity of being a research trainee of this Blueprint Program for Enhancing Neuroscience Diversity has helped me in many ways, not only in research experiences, academic approaches and community outreach activities, but also in deciding what I want for my future. In the present, I have set a priority to graduate from my Bachelor of Science degree in Biology with a GPA of 4.0 along with undergraduate research experiences, including poster presentations and attending meetings. For my graduate studies, I want to complete an MD/PhD degree in neuroscience, later on specializing in Neuroradiology.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **University of Puerto Rico, Río Piedras**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Eduardo Rosa-Molinar**

ENDURE Research Project Title: **Elucidating the "neuronal panglial syncytium"**

Elucidating the "neuronal panglial syncytium" 1Carolina Santiago Robles, 1Melanine Rodriguez-

Alvarado, 1Noraida Martinez-Rivera, 1Irma I. Torres-Vazquez, and 1,2Eduardo Rosa-Molinar 1Biological Imaging Group, University of Puerto Rico-Rio Piedras, Rio Piedras, Puerto Rico 00931 2Institute of Neurobiology, University of Puerto Rico-Medical Sciences, Old San Juan, Puerto Rico 00901 The "neuronal panglial syncytium", a large mesh of interconnected glial cells that are extensively coupled via gap junctions, extends through the central nervous system where, among other things, it provides ionic regulation of myelinated axons in white matter tracts. We demonstrate that both low-molecular-gap-junction-impermeant and high-molecular-gap-junction-permeant dye-coupling assays revealed "dye leakage" into the spinal cord white matter, raising the question of how the dye escapes. We believe that Kv1 channels allows both the impermeant and permeant dyes to diffuse into the periaxonal space and into the innermost layer of myelin through connexin-29. Then, through connexin-32, the both the impermeant and permeant dyes pass through the paranodal loops and outer layers of oligodendrocyte myelin surrounding the axoplasm and, finally, into astrocytes. These results extend our work on the "Gateway Hypothesis", and aid in elucidating the "neuronal panglial syncytium". Supported by NS-080687; GM-108470 (ERM); MH-086994 (ERM); NSF-1062963 (ERM), and NSF-0964114 (ERM).

ENDURE TRAINEE ABSTRACT

KARINA TORRES-TRISTANI

Home Institution and State: **University of Puerto Rico, Rio Piedras Campus, Puerto Rico**
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Undergraduate Academic Level: **Senior**
Undergraduate Major and Expected Graduation Date: **Cellular and Molecular Biology, May 2015**
Mentors/Advisors at Home Institution: **Dr. Carmen S. Maldonado**

ENDURE Trainee Scientific Interest:

My scientific interests revolve around behavioral neuroscience, specifically the studies that are involved with the processes of learning and memory mechanisms, which will give me better knowledge of neurological diseases, such as Alzheimer's. Among other interests in this field, I am also inclined to learn about the functions of the circadian rhythm and its effect on human behavior. Overall I look forward to combine these types of research to have a better understanding of different diseases in the nervous system.

ENDURE Trainee Career Goals and Plan:

Among my short-term goals are the opportunity of publishing a paper from my current research project and completing my Bachelor's Degree with honors in Cellular and Molecular Biology at the University of Puerto Rico. After graduating, I will pursue both the degree of Doctor of Medicine and Doctor of Philosophy, so that I can incorporate my scientific experience in neuroscience with medical practice. After, I will sub-specialize in neurosurgery and keep doing research to, hopefully, one day find a better treatment for a neurological disease using both my research and medical knowledge.

ENDURE Trainee Summer Research Experience:

ENDURE Summer Research Experience Institution: **Johns Hopkins University**

Mentors/Advisors at ENDURE Summer Research Experience Institution: **Dr. Peter C. Holland**

ENDURE Research Project Title: **Amygdalo-striatal interaction in the enhancement of stimulus salience in associative learning**

Function of the central nucleus of the amygdala (CeA) is critical to two aspects of attention in associative learning: the conditioning of orienting responses (ORs) to cues paired with food, and the enhancement of cue salience by the surprising omission of expected events. Such salience enhancements have been found to depend on interactions within a circuit that includes CeA, the substantia nigra pars compacta (SNc), the substantia innominata (SI), and the posterior parietal

cortex (PPC). The acquisition and expression of conditioned ORs requires interactions among CeA, SNc, and the dorsal lateral striatum (DLS), but not SI or PPC. Here, we considered whether CeA-DLS interactions are also important in surprise-induced salience enhancements in a serial prediction task. Rats received unilateral lesions of CeA and DLS, either contralaterally, which disrupted interactions between those structures, or ipsilaterally, which produced comparable damage to each structure but permitted interactions between them in one hemisphere. Rats with ipsilateral lesions of CeA and DLS showed the salience enhancements normally observed in this task, but rats with contralateral lesions of those structures did not. Thus, convergence of information processing by CeA and DLS is essential for surprise-induced salience enhancements, as well as for conditioned ORs.

COMPLETE ENDURE STUDENT ACTIVITIES AT SFN: November 15-18, 2014

SATURDAY Nov 15

7:00 – 11:00 am 4TH ANNUAL NIH BLUEPRINT ENDURE MEETING

Marriott Marquis, Independence Ballroom EFGH
(901 Massachusetts Avenue NW Washington, DC 20001)

*7:00 – 7:30 am Registration
7:30 – 9:30 am Featured Speakers
9:30 – 11:00 am T32 Recruitment Fair and Networking

1:00 - 2:00 pm GETTING THE MOST OUT OF SFN: THE ANNUAL MEETING AND BEYOND
Location: 207A

Students, postdocs, and others new to the SfN annual meeting are invited to this session where experienced participants will share tips on how to get the most out of your annual meeting experience, both during and after Neuroscience 2014. Whether you are looking for networking strategies or simply ways to make your experience productive and enjoyable, this session will be beneficial. Representatives from the SfN Program Committee, SfN Committee on Neuroscience Departments and Programs, the Faculty for Undergraduate Neuroscience, and an institutional postdoctoral association will provide strategies for navigating the annual meeting, discuss professional development tools available during and after the meeting, suggest ways to find and use a mentor, and answer questions from session participants.

1:00 – 3:00pm GRADUATE SCHOOL FAIR
Location: Walter E. Washington Convention Center – Hall E

Meet face-to-face with student advisors, program faculty, and graduate school representatives at the third annual Graduate School Fair.

6:30 – 8:30pm DIVERSITY FELLOWS POSTER SESSION
Location: Walter E. Washington Convention Center – Hall E

7:30 – 9:30pm CAREER DEVELOPMENT TOPICS: A NETWORKING EVENT
Location: Walter E. Washington Convention Center – Hall E

Experienced neuroscientists will be on hand to 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.

SUNDAY Nov 16

MORNING AND AFTERNOON
Attend Scientific Program
- Featured lectures
- Special lectures
- Symposia
- Minisymposia

Plan Your Itinerary for Neuroscience 2014

12:00 – 2:00pm GRADUATE SCHOOL FAIR
Location: Walter E. Washington Convention Center – Hall E

Meet face-to-face with student advisors, program faculty, and graduate school representatives at the third annual Graduate School Fair.

COMPLETE ENDURE STUDENT ACTIVITIES AT SFN: November 15-18, 2014

MONDAY Nov 17	MORNING AND AFTERNOON Attend Scientific Program •Featured lectures •Symposia •Special lectures •Minisymposia Plan Your Itinerary for Neuroscience 2014 12:00 – 2:00pm GRADUATE SCHOOL FAIR **Location: Walter E. Washington 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 18	MORNING AND AFTERNOON Attend Scientific Program •Featured lectures •Symposia •Special lectures •Minisymposia Plan Your Itinerary for Neuroscience 2014 12:00 – 2:00pm GRADUATE SCHOOL FAIR **Location: Walter E. Washington 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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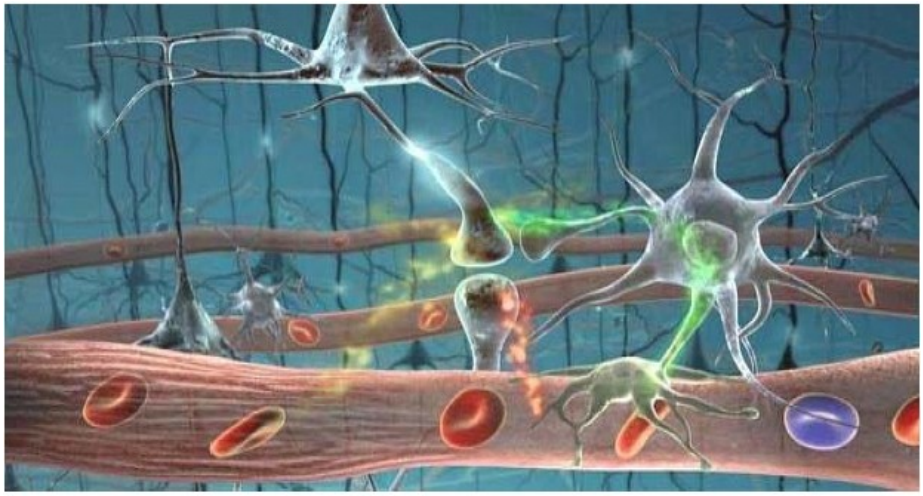

THANK YOU FOR YOUR PARTICIPATION