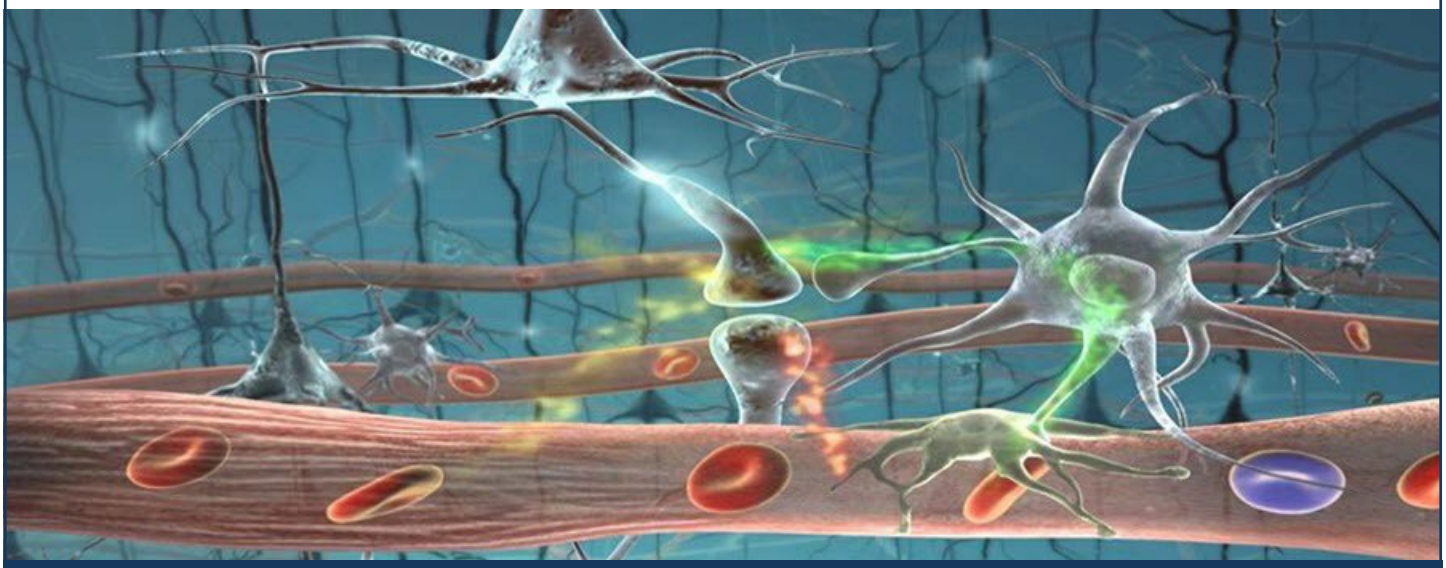
ENDURE

NIH Blueprint for Neuroscience Research



NIH Blueprint Enhancing Neuroscience Diversity through Undergraduate Research Education Experiences (ENDURE) 13th Annual Meeting

November 11, 2023

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

NCCIH	NIBIB	NIEHS
NEI	NICHD	NIMH
NIA	NIDA	NINDS
NIAAA	NIDCR	NINR

National Institutes of Health

CODE OF MEETING CONDUCT

NIH values the diversity of views, expertise, opinions, backgrounds, and experiences reflected among all attendees and respects the rights and privileges of others. NINDS is committed to fostering a welcoming community in which all participants can contribute fully.

All attendees at any NIH event are expected to ensure a safe and inclusive environment by complying with the following:

- Have respect and consideration of everyone, regardless of race, ethnicity, gender, gender identity or expression, sexual orientation, physical or mental ability, nationality or ancestry, age, socioeconomic status, belief, or any other basis protected by federal, state, or local laws.
- Promote a climate suitable for professional development and the exchange of ideas.
- Abide by the rules and policies of the meeting venue

Any harassment, discrimination, intimidation, and/or bullying will not be tolerated. Attendees should alert NIH staff or security of any inappropriate situations or anyone in distress.

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ENDURE PROGRAM GOALS

The NIH Blueprint for Neuroscience Research is a collaborative framework between the NIH Office of the Director and 12 NIH Institutes and Centers (ICs) to support research on the nervous system. By pooling resources and expertise, the Blueprint identifies cross-cutting areas of research and confronts challenges too large for any single IC. The NIH Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Research Education Experiences (BP-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 PhD programs. ENDURE provides undergraduate training through partnerships between research-intensive institutions and institutions with a substantial enrollment of neuroscience majors from diverse groups. This includes individuals from underrepresented racial and ethnic groups, individuals with disabilities, and individuals from economically disadvantaged backgrounds. ENDURE undergraduate training programs support a range of activities to increase student interest and involvement in the neurosciences, including research experiences, core and advanced neuroscience courses, seminars, and journal clubs. In FY10, five ENDURE awards were granted and six awards were granted in FY15. We currently have ten active awards, with six awards made in FY20 and four in FY21.

ENDURE MEETING GOALS

As issued, the funding announcement (RFA-NS-20-015) 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 this virtual meeting will be to discuss best practices and provide a forum for student scientific and academic enhancing activities. Students will broaden their networks with other ENDURE participants, peer mentors from ENDURE Alumni and other diverse graduate students, and T32 program directors.

ORGANIZING COMMITTEE

Dr. Anahid Ebrahimi (NIH/NINDS)

Dr. Michelle Jones-London (NIH/NINDS)

Dr. Jenny Kim (NIH/NINDS)

Dr. Marguerite Matthews (NIH/NINDS)

Dr. Lauren Ullrich (NIH/NINDS)

For more information about BP-ENDURE and the program sites over our 13-year history, visit https://neuroscienceblueprint.nih.gov/endure-undergraduate-education

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Follow NINDS Office of Programs to Enhance Neuroscience Workforce Diversity on Twitter @NINDSDiversity

Subscribe to the NINDS Diversity News to Use listerv

13th Annual Enhancing Neuroscience Diversity through Undergraduate Research Education Experiences (ENDURE) Meeting

AGENDA

Westin Washington, DC Downtown Hotel | Rock Creek Ballroom ABC
Washington, DC
November 11, 2023

7:00 – 7:30 am **Registration**

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

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

7:40 – 8:00 am **NIH BRAIN Initiative® and Blueprint Welcome and "Ask Me Anything"**

Dr. John Ngai, Director, NIH BRAIN Initiative®

Dr. Bruce J. Tromberg, Director, National Institute of Biomedical Imaging and Bioengineering

Dr. Rita Valentino, Director, Division of Neuroscience and Behavior, National Institute on Drug Abuse

8:00 – 8:30 am **Keynote Address**

Dr. Nathan Smith, Associate Professor of Neuroscience and Associate Dean for Equity & Inclusion for Research and Research Education, University of Rochester

Q&A

8:30 – 9:30 am **Panel on Pathways and Perspectives on Advancing Your Career**

Moderated by Dr. Marguerite Matthews, Program Director, OPEN, NINDS

What should a student expect out of graduate training programs? What are effective strategies to navigate some of the challenges of research training? What are the qualities of a good mentor? What makes your career in neuroscience fulfilling?

Each panelist will share their scientific background, their experiences being underrepresented in neuroscience, and lessons learned navigating their career.

Panelists:

Shekinah Phillips, ENDURE alum, current D-SPAN F99 predoctoral fellow at the University of Alabama at Birmingham

Dr. Tony Larkin, D-SPAN K00 postdoctoral fellow at the University of Michigan

Dr. Justin Brantley, ENDURE and D-SPAN alum, current Senior Analyst of Baseball R&D, Texas Rangers Baseball Team, the 2023 World Series Champions

9:30 – 11:30 am **Graduate Program Recruitment and Networking Fair**

SPEAKER BIOGRAPHIES

NIH BRAIN & BLUEPRINT LEADERSHIP

John J. Ngai, PhD
Director
NIH BRAIN Initiative®

John J. Ngai, PhD, is the Director of the NIH's Brain Research Through Advancing Innovative Neurotechnologies® (BRAIN) Initiative. Dr. Ngai earned his bachelor's degree in chemistry and biology from Pomona College, Claremont, California, and PhD in biology from the California Institute of Technology (Caltech) in Pasadena. He was a postdoctoral researcher at Caltech and at the Columbia University College of Physicians and Surgeons before starting his faculty position at the University of California at Berkeley. During more than 25 years as a Berkeley faculty member, Dr. Ngai has trained 20 undergraduate students, 24 graduate students and 15 postdoctoral fellows in addition to teaching well over 1,000 students in the classroom. His work has led to the publication of more than 70 scientific articles in some of the field's most prestigious journals and 10 U.S. and international patents. Dr. Ngai has received many awards including from the Sloan Foundation, Pew Charitable Trusts, and McKnight Endowment Fund for Neuroscience. As a faculty member, Dr. Ngai has served as the director of Berkeley's Neuroscience Graduate Program and Helen Wills Neuroscience Institute. He has also provided extensive service on NIH study sections, councils and steering groups, including as previous co-chair of the NIH BRAIN Initiative Cell Census Consortium Steering Group. Dr. Ngai oversees the long-term strategy and day-to-day operations of the NIH BRAIN Initiative as it strives to revolutionize our understanding of the brain in both health and disease.

Bruce J. Tromberg, PhD
Director
National Institute of Biomedical Imaging and Bioengineering

Bruce J. Tromberg, PhD, is the Director of the National Institute of Biomedical Imaging and Bioengineering (NIBIB) at the National Institutes of Health (NIH) where he oversees a portfolio of research programs focused on developing, translating, and commercializing engineering, physical science, and computational technologies in biology and medicine. In addition, he leads NIBIB's Rapid Acceleration of Diagnostics (RADx Tech) program, a $1.7 billion initiative to increase SARS-COV-2 testing capacity and performance. His laboratory, the Section on Biomedical Optics (SBO) in the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), develops portable, bedside, non-contact, and wearable technologies for quantitative sensing and imaging of tissue composition and metabolism.

Prior to joining NIH in January 2019, he was a professor of biomedical engineering and surgery at the University of California, Irvine (UCI). During this time, he served as director of the Beckman Laser Institute and Medical Clinic (BLIMC) (2003-2018) and the Laser Microbeam and Medical Program (LAMMP), an NIH National Biomedical Technology Center at the BLIMC (1997-2018). Dr. Tromberg specializes in the development of optics and photonics technologies for biomedical imaging and therapy. He has co-authored more than 450 publications and holds 25 patents in new technology development as well as bench-to-bedside clinical translation, validation, and commercialization of devices. He has trained more than 80 students and fellows, is co-founder of the biophotonics company, Modulim, Inc, and has served on numerous advisory boards in academia, industry, government, and private foundations. Dr. Tromberg received his undergraduate training in chemistry from Vanderbilt University (1979) and MS and PhD degrees in chemistry from the University of Tennessee (1988) where he was a U.S. Department of Energy/Oak Ridge Associated Universities Fellow at the Oak Ridge National Laboratory. He was a Hewitt Foundation Photomedicine Fellow at the BLIMC and joined the UC Irvine faculty in 1990.

Follow the National Institute of Biomedical Imaging and Bioengineering on Twitter/X @NIBIBgov.

Rita Valentino, PhD
Director of the Division of Neuroscience and Behavior
National Institute on Drug Abuse

Rita Valentino, PhD, is the director of the Division of Neuroscience and Behavior (DNB) at the National Institute on Drug Abuse (NIDA). She leads program staff to set a vision that advances the basic and clinical research mission of NIDA to elucidate the neurobiological underpinnings of substance use disorders from the molecular to behavioral level and to discover approaches for treating it. She bridges DBN with the Division of Therapeutics and Medical Consequences and Division of Epidemiology, Services and Prevention Research by promoting translation from target discovery to drug development and by using epidemiology to inform research directions. Dr. Valentino represents NIDA on trans-NIH initiatives including BRAIN, Neuroscience Blueprint, and Coordinating Committee on Research on Women's Health. Her career spans 26 years of academic, research, and leadership experience in neuropsychopharmacology and stress neurobiology. She previously directed the Stress Neurobiology Division within the Department of Anesthesiology at The Children's Hospital of Philadelphia and was a Professor of Anesthesiology and Critical Care at the University of Pennsylvania School of Medicine, Philadelphia. Dr. Valentino is particularly recognized for her research on the neurobiology of stress, the impact of sex, age and coping style on behavioral and cognitive health, and how this can determine vulnerability to substance use. She is a Fellow of the American College of Neuropsychopharmacology and a Fellow of the American Society for Pharmacology and Experimental Therapeutics.

Follow the National Institute on Drug Abuse on Twitter/X @NIDAnews.

KEYNOTE SPEAKER

Nathan A. Smith, PhD
Associate Dean for Equity and Inclusion in Research and Research Education
Associate Professor of Neuroscience

Dr. Nathan A. Smith is the new Associate Dean for Equity and Inclusion in Research and Research Education and an Associate Professor of Neuroscience in the School of Medicine and Dentistry at the University of Rochester. Previously, he served as the Director of Basic Neuroscience Research, Principal Investigator at the Center for Neuroscience Research at Children's National Research Institute, and Assistant Professor of Pediatrics and Pharmacology & Physiology at George Washington University School of Medicine and Health Sciences. Dr. Smith earned his B.S. in Biology from Xavier University of Louisiana and his MS and PhD in Neuroscience from the University of Rochester School of Medicine and Dentistry. In 2013, he became the first Black American to receive a PhD from the neuroscience program at the University of Rochester School of Medicine. Following graduation, Dr. Smith conducted postdoctoral research at the University of Utah, Boston University, and Children's National Hospital. Dr. Smith has received numerous honors and awards throughout his career, including the Vanderbilt University Juneteenth Award in 2022. He was elected as a 2021 Fellow of the American Association for the Advancement of Science (AAAS) and was recognized by Cell Press as one of the 1000 most inspiring Black Scientists in America in 2020. Additionally, he received the 2019 Neuroscience Alumni Award from the University of Rochester and the 2018 Children's National President's Award for Innovation in Research. Dr. Smith's research focuses on investigating the understudied and novel mechanisms by which neuromodulators mediate interactions between neurons, astrocytes, and microglia in normal and disease states. He utilizes a combination of transgenic animals, electrophysiology, pharmacology, behavioral assays, and 2-Photon Ca2+ imaging in acute slices and awake-behaving animals.

Follow Dr. Smith on Twitter/X @NathanASmith1.

PATHWAYS PANELISTS

Justin Brantley, PhD
Senior Analyst
Texas Rangers Baseball Team

Justin Brantley is a senior analyst for the Texas Rangers Baseball Team, where his work involves using statistical modeling and machine learning to solve a wide range of baseball data science problems. He is passionate about problems involving movement optimization, injury prevention, and player health. In addition, he plans to use his research experience to continue studying neuroscience and movement science problems, using baseball as an example of a real-world movement. Dr. Brantley completed a postdoc in the Kording Lab at the University of Pennsylvania where he used baseball data to

show strong real-world evidence of Bayesian-brain behavior. Prior to joining the Kording Lab, he received his PhD from the University of Houston under the supervision of Dr. Jose Contreras-Vidal, where he focused on developing non- invasive neural interfaces, robotic rehabilitation, and prosthetic devices for the restoration of lost function. For his dissertation, he developed a real-time brain-machine interface for control of a powered-leg prosthesis by above-the-knee amputees.

Follow the Texas Rangers, 2023 World Series Champions, on Twitter/X @Rangers.

Tony E. Larkin, II, PhD
Postdoctoral Research Fellow
University of Michigan

Tony E. Larkin II is a Postdoctoral Research Fellow at the University of Michigan, and co-founder of HBCU-DAP. His research interest span examining mechanisms of sensory hypersensitivity among patients with chronic pain and healthy individuals. To date his research includes the use of functional connectivity and graph theoretical analyses on data acquired through noninvasive neuroimaging (e.g., fMRI) to understand how the brain works as a complex system. In addition to his commitment to science, he is committed to empowering students in pursuit of doctoral degrees in the biomedical sciences and careers in the STEM workforce. Tony graduated from Morehouse College in 2013 with a BS in Biology with Honors and received his PhD in Neuroscience from the University of Michigan.

Follow HBCU-DAP on Twitter/X @HBCU-DAP.

Shekinah Phillips
Predoctoral Fellow
University of Alabama at Birmingham

Shekinah Phillips is a PhD candidate, at the University of Alabama at Birmingham in Dr. Lori McMahon's laboratory in the Department of Neuroscience at the Medical University of South Carolina. She completed her undergraduate studies at Agnes Scott College where she earned her BS in Biology and participated in the BP ENDURE program. As an ENDURE Scholar, she performed research at Brown University examining how different attentional states affect gradual, implicit visuomotor learning in human subjects and completed her senior thesis investigating the effect of retrospective attention on memory systems under the direction of Dr. Audrey Duarte at the Georgia Institute of Technology. During her time in medical school, she realized that her underlying passion was in understanding "the whys and how's of neurological processes and utilizing research as a translational approach. Thus, she decided to change the trajectory of her academic career path and pursue her PhD in Biomedical Sciences with a concentration in Neuroscience. Her dissertation research utilizes electrophysiological techniques to focus on the effects of O-GlcNAcylation on GABAergic transmission in the

presence of phosphorylation and drugs of abuse in the rat hippocampus. Shekinah was recently awarded the DSPAN F99/K00 which would further support her long-term career goal in tackling fundamental questions about post-translational modifications in the diseased brain, while developing therapeutic tools to treat neurodegenerative disorders. Shekinah is committed to mentoring the next generation of neuroscientists and is an active leader in student organizations that foster the ambition to increase accessibility of scientific opportunities to underrepresented communities.

Follow Shekinah on Twitter/X @ShekinahPhilli3.

ENDURE PROGRAM INFORMATION

BP-ENDURE AT HUNTER COLLEGE & NYU

HUNTER COLLEGE & NEW YORK UNIVERSITY

http://www.bpendure.org/

Partner Institutions: Brown University, the University of Michigan, Vanderbilt University, Yale University

Principal Investigator: Dr. Nesha Burghardt | Hunter College

Principal Investigator: Dr. Glenn Schafe | Hunter College

Principal Investigator: Dr. Chiye Aoki | New York University

Advisor: Dr. Margarita Kaplow | New York University

Program Coordinator: Kizzy Vazquez | Hunter College

Description: The overall goal of BPENDURE at Hunter College and NYU is to develop and refine the neuroscience training program at Hunter that will encourage and prepare students from diverse backgrounds to enter into and succeed in neuroscience PhD programs. To achieve this goal, Hunter College has developed a research-educational partnership with five outstanding T32-awarded universities: New York University, Brown, the University of Michigan, Vanderbilt, and Yale. This partnership will expose 12-14 BP-ENDURE students from Hunter College and NYU 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 more applied neuroscientists from the areas of clinical and cognitive neuroscience.

BRIDGE TO PHD IN NEUROSCIENCES PROGRAM

MICHIGAN STATE UNIVERSITY

https://translationalscience.msu.edu/prospective-trainees/endure/index.html

Partner Institutions: Ana G. Méndez University, Arizona University, North Carolina Central University, Northern New Mexico College, Pontifical Catholic University Puerto Rico, St. Mary's University (San Antonio, Texas), University of Puerto Rico-Arecibo, University of Puerto Rico-Cayey, University of Puerto Rico-Humacao, University of Puerto Rico-Ponce

Principal Investigator: Dr. Irving Vega | Michigan State University

Co-Investigator: Dr. Gina Leinninger | Michigan State University

Program Coordinator: Fabiola Sotomayor-Reinat | Michigan State University

Description: The Bridge to Ph.D. in Neurosciences Program (BPNP) was created with the objective of increasing the number of underrepresented Ph.Ds. trained in the neurosciences; specifically, to facilitate the entry of students into the Ph.D. program in Neuroscience at MSU and enhance the likelihood of their success. Students who have completed two summers of research are eligible to complete the fall semester of their senior undergraduate year at MSU. During the fall semester, the selected students take 9 credits of undergraduate courses in the neuroscience area, further develop the research project they began during the prior summer and receive one-on-one mentoring to develop competitive applications for graduate school.

BROOKLYN NEURAL NETS (NEUROSCIENCE EDUCATION AND TRAINING FOR SCIENTISTS)

BROOKLYN COLLEGE

https://brooklyn.cuny.edu/bnets

Partner Institutions: Medgar Evers College (MEC) and State University of New York (SUNY) Downstate Medical Center

Principal Investigator: Dr. Louise Hainline | Brooklyn College

Co-Investigator: Dr. Paul Forlano | Brooklyn College

Co-Investigator: Dr. Mark Stewart | SUNY Downstate Medical Center

Associate: Dr. Mohsin Patwary | Medgar Evers College

Description: Our program, Brooklyn Neural NETS (Neuroscience Education and Training for Scientists) or B-NETS, prepares well-qualified underrepresented (UR) juniors and seniors to enter careers in the neurosciences that require PhD or MD/PhD degrees. B-NETS Fellows will increase the diversity of researchers in neuroscience and contribute research findings to address chronic neurological conditions that occur more frequently in minority and low-income populations, including the catchment area of the participating institutions where our students live and study. Working as a consortium and exploiting prior successful cross-institution collaborations, B-NETS is providing our Fellows with academic and research experiences to foster the development of strong research skills as well as the motivation to pursue careers in the broad field of the Neurosciences. The proposed BNETS program will meet the goal of developing neuroscience research education programs by creating a full neuroscience major at BC and an expanded neuroscience curriculum at MEC. The senior administration of all three B-NETS partner institutions has prioritized STEM diversity programs and increasing faculty diversity and fully supports the B- NETS program.

INSPIRING DIVERSITY TO EXPLORE THE BRAIN IN THE 21ST CENTURY: THE NIH/NINDS-LSUHSC-NO, UNDERGRADUATE DIVERSITY IN NEUROSCIENCE RESEARCH EXPERIENCES

LOUISIANA STATE UNIVERSITY HEALTH SCIENCES CENTER NEW ORLEANS (LSUHSC-NO)

https://www.medschool.lsuhsc.edu/odce/endure/

Partner Institutions: Dillard University, Louisiana State University and A&M College, Loyola University New Orleans, Southeastern University of Louisiana, Southern University at New Orleans, Tulane University, University of New Orleans, Xavier University of Louisiana

Principal Investigator: Dr. Allison Augustus-Wallace | LSUHSC-NO

Co-Investigator: Dr. Scott Edwards | LSUHSC-NO

Co-Investigator: Dr. Hamilton Farris | LSUHSC-NO

Co-Investigator: Dr. Patricia Molina | LSUHSC-NO

Co-Investigator: Dr. Fern Tsien | LSUHSC-NO

Program Coordinator: Melissa Prestwood | LSUHSC-NO

Description: Inspiring Diversity to Explore the Mind in the 21st Century: The NIH/NINDS-LSUHSC-NO, Undergraduate Diversity in Neuroscience Research Experiences Program is a one year, nonresidential/commutator undergraduate summer academic enrichment program, which will provide students from partnered-institutions the opportunity to perform research and experience graduate education under the egis of neurosciences. This program leverages multi-university partnerships to provide structured mentored research experiences in neuroscience to undergraduate students from underrepresented/underserved populations in Louisiana. This is accomplished through summer and year-round mentor and mentee training in science, critical thinking, professional, and career skills. The program will increase the number of diverse applicants prepared for independent research, graduate school, and, ultimately, careers in neuroscience, helping to address population disparities in neurological diseases.

THE MID-ATLANTIC NEUROSCIENCE DIVERSITY SCHOLARS (MiNDS) PROGRAM

TEMPLE UNIVERSITY

https://sites.temple.edu/minds/

Partner Institutions: Drexel University; Lincoln University of Pennsylvania; University of Maryland, College Park; University of Maryland School of Medicine

Principal Investigator: Dr. Ingrid R. Olson | Temple University

Subcontract Principal Investigator: Dr. Matthew Roesch | University of Maryland, College Park

Recruitment and Retention Coordinator: Dr. Lisa Briand | Temple University

Community Engagement Coordinator: Dr. Vishnu Murty | Temple University

Community Engagement Coordinator: Heather Lewis-Weber | Temple University

Program Coordinator: Alenah Yi | Temple University

Description: The Mid-Atlantic Neuroscience Diversity Scholars (MiNDS) program aims to bolster the number of underrepresented minority (URM) students within the neuroscience academic pipeline and build a foundation for URM students to succeed in graduate school and beyond. Our two-year program brings together scholars from Temple University, Lincoln University, and University of Maryland College Park beginning the summer prior to scholars' junior year. The program provides scholars with the tools necessary to persist in academia by focusing on 6 elements: integrated research experiences during the academic year, immersive summer research experiences at R1 universities, opportunities to build presentation skills at local and national meetings, coursework to build technical excellence in neuroscience, professional skills training and mentoring to facilitate transition into neuroscience graduate programs, and outreach activities to foster community and build teaching skills.

NEUROSCIENCE RESEARCH OPPORTUNITIES TO INCREASE DIVERSITY (Neuro-ID)

UNIVERSITY OF PUERTO RICO, RÍO PIEDRAS CAMPUS

http://neuroid.uprrp.edu/

Partner Institutions: Inter American University of Puerto Rico at Bayamón, Metropolitan University, Sacred Heart University of Puerto Rico

Principal Investigator: Dr. Jose E. García-Arrarás | University of Puerto Rico, Río Piedras Campus

Principal Investigator: Dr. Carmen S. Maldonado-Vlaar | University of Puerto Rico, Río Piedras Campus

Program Coordinator: Marimar Velázquez-Vargas | University of Puerto Rico, Río Piedras Campus

Description: NeuroID is a program designed to increase diversity in Neuroscience by providing opportunities to undergraduate students interested in this area and enhance their scientific knowledge, research capability, and social responsibility.

NEVADA ENDURE

UNIVERSITY OF NEVADA, RENO

https://www.unr.edu/science/student-resources/nevada-endure-program

Partner Institutions: Stanford University, Truckee Meadows Community College (TMCC), University of California Berkeley, University of California Davis, University of Michigan

Principal Investigator: Dr. Mariann Weierich | University of Nevada, Reno

Co-Investigator: Dr. Marian Berryhill | University of Nevada, Reno

Co-Investigator: Dr. Dennis Mathew | University of Nevada, Reno

Program Coordinator: Lauren Levi | University of Nevada, Reno

Description: The Nevada ENDURE Program is a two-year intensive neuroscience research training program. The University of Nevada, Reno (UNR) partners with Truckee Meadows Community College to recruit talented sophomores from backgrounds that are underrepresented in neuroscience. Nevada ENDURE trainees begin the program in the summer before the junior year, during which they are paid to work full-time for 10 weeks in a neuroscience research lab at one of our summer partner institutions: UC Berkeley, UC Davis, the University of Michigan, or Stanford University. During the summer before the senior year, trainees similarly conduct research at a second summer partner institution. During the junior and senior academic years, trainees are paid to work 15 hours per week in a UNR neuroscience research lab and they also attend a weekly seminar that provides additional training in topics including professional development, research ethics, and preparing research for presentation. Trainees also attend and present at research conferences including the annual Society for Neuroscience meeting.

SUMMER TRANSFER AHEAD INTO RESEARCH TRAINING IN NEUROSCIENCE (STARTneuro)

UNIVERSITY OF CALIFORNIA SAN DIEGO

https://startneuro.ucsd.edu/

Partner Institutions: City College of San Francisco, Cuyamaca Community College, De Anza Community College, Grossmont Community College, Imperial Valley College, MiraCosta College, Pasadena City College, San Diego Miramar College, Saddleback Community College, Solano Community College, Southwestern College

Principal Investigator: Dr. Ashley L. Juavinett | University of California, San Diego

Principal Investigator: Dr. Brenda Bloodgood | University of California, San Diego

Co-investigator: Dr. David Artis | University of California, San Diego

Co-investigator: Dr.Terry Gaasterland | University of California, San Diego

Co-investigator: Dr. Stanley Lo | University of California, San Diego

Co-investigator: Dr. Eduardo Macagno | University of California, San Diego

Program Coordinator: Jason Avalos | University of California, San Diego

Description: STARTneuro trains and mentors diverse transfer students as they enter neuroscience research with the goal of preparing them to apply for PhD programs. Our program begins with a 10-week summer research training program to ramp students up on key neuroscience techniques and facilitates lab placements with faculty mentors during the school year. During the academic year, students will meet regularly with program faculty, be shepherded into laboratory internships, and be mentored in applying for a research scholarship the following summer. STARTneuro also provides professional development workshops for mentors, including graduate students, postdoctoral 15 scholars, research staff, and faculty, to work with transfer students in their labs.

UNIVERSITY OF WASHINGTON ENDURE

UNIVERSITY OF WASHINGTON

http://depts.washington.edu/endure/

Partner Institutions: Puget Sound Community Colleges

Principal Investigator: Dr. Horacio O. de la Iglesia | University of Washington

Co-Investigator: Dr. Eric H. Chudler | University of Washington

Program Manager: Jessica Huszar | University of Washington

Description: The goal of UW ENDURE is to mentor and train undergraduates who belong to underrepresented minorities in the sciences to transition into successful graduate careers in neuroscience. Our ENDURE program specifically targets undergraduates in community colleges within the Puget Sound regions. Participants are part of a full-time summer research experience and year-round training in quantitative and computational skills, basic principles of neuroscience, writing and oral communication courses and workshops, and network activities intended to increase their sense of identity with academic STEM environments and guide them towards a successful application to a competitive neuroscience graduate program.

WUSTL ENDURE

WASHINGTON UNIVERSITY IN ST. LOUIS

http://endure.wustl.edu/

Partner Institutions: Harris-Stowe State University, St. Louis University, University of Missouri-St. Louis

Principal Investigator: Dr. Erik Herzog | Washington University in St. Louis

Program Coordinator: Lori Corzine | Washington University in St. Louis

Description: The Washington University in St. Louis (WUSTL) ENDURE research program prepares undergraduates from diverse backgrounds for neuroscience PhD programs. We combine outstanding research training, a rigorous curriculum and an empowering support system so participants thrive on their path to graduate school and beyond. With support from the NIH Blueprint ENDURE initiative and Washington University, accepted students are funded for up to two years and trips to the annual Society for Neuroscience meeting. Overall, the program embeds students in a network of neuroscientists and enhances the success of trainees towards our goal of increasing diversity in neuroscience.

ENDURE SCHOLAR PROFILES

Bryson Aldridge

Email: Bryson.aldridge04@gmail.com

Home Institution: Xavier University of Louisiana

Undergraduate Major and Graduation Date: Neuroscience, 2025

Science Interests: I am interested in physical sciences, as well as biochemistry and ecology.

Career Goals: I want to bring more insight into health around my community so I aspire to become a physician.

Giovanna Arantes de Oliveira Campos

Pronouns: they/them/theirs

Email: giovanna.campos@temple.edu

Home Institution: Temple University

Undergraduate Major and Graduation Date: Neuroscience, 2024

Science Interests: In general, I am interested in brain-behavior relationships in cognition and learning processes. Thus, I am interested in developmental neuroscience, education, clinical psychology, and their intersection. Right now, my specific interests lie in structural and functional connectivity in developmental disorders, such as autism, and non-motor functions of the cerebellum.

Career Goals: My goal is to pursue a PhD degree in clinical psychology with a focus in pediatric clinical neuropsychology. Long term, I want to become a practicing clinician, researcher, and professor in an academic medical center.

Mary Avella

Pronouns: she/her/hers

Email: mary.avella37@myhunter.cuny.edu

Home Institution: Hunter College

Undergraduate Major and Graduation Date: Psychology with concentration in Behavioral Neuroscience, 2025

Science Interests: I am interested in the Neuroscience of Autism.

Career Goals: My goal is to get a PhD in neuroscience, complete a postdoc and have my own research lab at a university.

Lauren Blagmond

Email: laurenblagmond@gmail.com

Home Institution: Temple University

Undergraduate Major and Graduation Date: Neuroscience, 2025

Science Interests: I am interested in Biology, Chemistry, Psychology, Neuroscience.

Career Goals: My goal is Medical School.

Kailyn Butler

Pronouns: she/her/hers

Email: butle262@msu.edu

Home Institution: Michigan State University

Undergraduate Major and Graduation Date: Neuroscience, 2025

Science Interests: My research focuses on Lateral Hypothalamic Cells projecting to the Dorsal Motor Nucleus Of the Vagus. Through this research, I am currently working on to see how much of an effect do LHA to DMNV projections have on Cephalic Phase Insulin Release (CPIR). I aim to provide insight into the brain circuitry controlling CPIR and efficient glucoregulation. Findings can inform how the brain regulates blood glucose and offers potential targets for the treatment of disruptions in glucoregulation such as that seen with diabetes.

Career Goals: I am a third-year undergraduate student studying neuroscience with a minor in bioethics. I plan to pursue a MD/PhD or a MD/MPH dual degree to further enhance her passion on racial inequality in healthcare and how it affects children.

Victoria Cadena

Pronouns: she/her/hers

Email: cadena.j@wustl.edu

Home Institution: Washington University in St. Louis

Undergraduate Major and Graduation Date: Biology: Neuroscience, 2025

Science Interests: I am interested in developmental neuroscience and psychiatry, specifically in exploring the relationship between behavior and the brain in children.

Career Goals: I plan to pursue a MD/PhD in neuroscience, focusing on psychiatric disorders.

Anthony Campuzano

Pronouns: he/him/his

Email: acampu2@uw.edu

Home Institution: University of Washington

Undergraduate Major and Graduation Date: Neuroscience, 2026

Science Interests: My scientific interests are about dopamine and the role it has in the brain with behavior and motivation.

Career Goals: My career goals are to be able to mentor people in neuroscience or other fields, while also do something in medicine. I want to be able to contribute to scientific findings and build upon what is already known.

Miles Carter

Email: mcarter3214@gmail.com

Home Institution: New York University

Undergraduate Major and Graduation Date: Neural Science, 2024

Science Interests: My scientific interests are Alzheimer's Disease, learning and memory, and imaging.

Career Goals: I plan to pursue a PhD.

Gaby Castro

Pronouns: she/her/hers

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Home Institution: Temple University

Undergraduate Major and Graduation Date: Psychology, 2025

Science Interests: My scientific interests are investigating underlying neural circuitry in mood disorders through methods of brain imaging.

Career Goals: My career goal is to obtain a PhD in Neuroscience and pursue a full-time career in research and academia.

Tonya Chaney

Pronouns: she/her/hers

Email: tchan3@lsuhsc.edu

Home Institution: Xavier University of Louisiana

Undergraduate Major: Neuroscience

Science Interests: My research interest is how neuronal circuitry pathways respond/ influence neurological disorders.

Career Goals: My career goal is to become a neurologist and to conduct or assist in conducting clinical research.

Vivan Chen

Pronouns: she/her/hers

Email: vivchen@uw.edu

Home Institution: University of Washington

Undergraduate Major and Graduation Date: Biology, 2025

Science Interests: I am interested in ways fear affects circadian rhythms, brain fear circuitry, ways that circadian rhythm affects physiological pathways, and ways to mitigate sleep disruption.

Career Goals: My career goals include furthering my education through study in graduate school or medical school programs, develop my skills as a scientist, and improve my understanding of biological systems.

Valeria Clemente

Pronouns: she/her/hers

Email: valeria.clemente@upr.edu

Home Institution: University of Puerto Rico-Humacao

Undergraduate Major and Graduation Date: General Biology, 2023

Science Interests: My scientific interests are to continue research related to neuroscience. Also, I like the research in behavioral neurosciences.

Career Goals: My career goal is to become a doctor in medicine with a specialty in neurology. I would like to combine clinical practice with research in behavioral neurosciences.

Shylyn Collier

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Email: shylyn@wustl.edu

Home Institution: University of Missouri-St. Louis

Undergraduate Major and Graduation Date: Biochemistry and Biotechnology, 2024

Science Interests: My scientific interests are studying neurodevelopmental disorders on a molecular basis and uncovering targets to find new therapeutic treatments.

Career Goals: I want to become a professor that focuses their responsibility in research, mentorship, and teaching.

Gian Correa

Pronouns: he/him/his

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Home Institution: Pontifical Catholic University of Puerto Rico (PCUPR)

Graduation Date: 2025

Science Interests: I am currently interested in Neuroscience, specifically neurodegenerative dissorders such as Alzheimer's Disease or Parkingson's Disease. I would like to contribute as much as possible to the development of research related to these diseases since these diseases are common, yet they have no known cure, only treatments.

Career Goals: My long term carreer goal is to obtain an MD and become a neurosurgeon. The experience acquired from the BPNP-ENDURE program will favor me when applying for medical school, however, I would love to blend the elegance of medicine with the precision and critical thinking done in research, as well as incorporate learned tools and new skills in my future career.

Andrea Corretjer Diaz

Pronouns: she/her/hers

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Home Institution: University of Puerto Rico, Río Piedras Campus

Undergraduate Major and Graduation Date: Biology, 2025

Science Interests: My current scientific interests include mental health and the development of new pharmacological treatments. I'm passionate about psychedelic treatment research and the various disorders it has the potential to treat.

Career Goals: I aspire to complete a PhD in neuroscience and contribute to research in mental health, specifically anxiety, depression, and substance abuse disorders. Along the way, I hope to implement women's reproductive health in mental health research in a way gives women the opportunity to be represented in medical research.

Christian Cortes

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Home Institution: University of California, San Diego

Undergraduate Major and Graduation Date: Clinical Psychology, 2024

Science Interests: I am interested in the biological and behavioral mechanisms of Post Traumatic Stress Disorder as well as its intersection with addictions.

Career Goals: My career goal is to attend a Clinical Psychology PhD program in order to become a licensed Clinical Psychologist.

Kensel Coudriet

Pronouns: she/her/hers

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Home Institution: University of Nevada, Reno

Undergraduate Major and Graduation Date: Neuroscience, 2025

Science Interests: I am fascinated by the cognitive and behavioral branches of neuroscience. Specifically, I am interested in the emotional regulation and mediation of stress and anxiety-related disorders. Furthermore, I value the investigation of perception and am interested in learning more about the intricate processes that contribute to how we view the world. I would also like to learn more about how stress and anxiety disorders can shape or alter perception.

Career Goals: I plan to continue my education and earn a PhD in neuroscience after completing my undergraduate degree. I am passionate about academia and wish to contribute to the field of neuroscience as a career.

Angélica Sofía Cruz Calderón

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Home Institution: University of Puerto Rico, Río Piedras Campus

Undergraduate Major and Graduation Date: Chemistry, 2025

Science Interests: My scientific interests focus on the development of therapeutic treatments aimed at neurological disorders, especially epilepsy.

Career Goals: I plan to pursue an MD/PhD and continue my research in neuropharmacology so that I can apply my knowledge in the discovery and development of new treatments for disorders of the nervous system

Tamara Dandreamatteo

Pronouns: she/her/hers

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Home Institution: Washington University in St. Louis

Undergraduate Major and Graduation Date: Biomedical Engineering, 2025

Science Interests: My scientific interest is neuroimmunology, specifically its role in neurodegeneration and neurodevelopment.

Career Goals: I plan to pursue a MD/PHD and eventually conduct clinical research.

Clifton David

Pronouns: he/him/his

Email: clifdavinchi29@gmail.com

Home Institution: CUNY Brooklyn College

Undergraduate Major and Graduation Date: Psychology and Philosophy, 2025

Science Interests: I'm interested in studying neuroscience--in relation to philosophy, be it religion or various

branches of philosophy (ontology, epistemology, etc). All in all, how one's beliefs are able to have great impact on their being.

Career Goals: I aspire to be an author--one who distributes ideas and research findings to the general populace, as I find it vital, to distribute knowledge to all willing to listen. Moreover, I envision myself as a clinical psychologist as well.

Omaris Y De Pablo Crespo

Pronouns: she/her/hers

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Home Institution: University of Puerto Rico, Río Piedras Campus

Undergraduate Major and Graduation Date: Cellular Molecular Biology, 2025

Science Interests: My scientific interests are focused in neuroscience, specifically the connectome, neural circuits, neural mechanisms and complex motor behaviors.

Career Goals: My career goal is to grow in the field of neuroscience and obtain a PhD in this field, to eventually have my own lab and be a role model for the next generation of scientists.

Patrick Desince

Email: patrickdesince@icloud.com

Home Institution: CUNY Brooklyn College

Undergraduate Major: Health and Nutritional Sciences

Science Interests: I'm interested in the study of basic learning processes specifically Pavlovian and instrumental learning using lab animals as subjects.

Career Goals: My career goals are to conduct research and add to the current body of knowledge in the field of Neuroscience. Furthermore, to pursue a PhD in Neuroscience.

Christian Diaz Perez

Pronouns: he/him/his

Email: cadiaz1226@gmail.com

Home Institution: University of Maryland, College Park

Undergraduate Major: Physiology and Neurobiology

Science Interests: I have an interest Neurocognitive development in children (Hippocampus). I also am interested in sleep science and its effects on development.

Career Goals: I want to attend medical school after I finish my undergrad. I want to be a physician working in pediatrics.

Alejandro Dueno Sosa

Email: alejandro.dueno@upr.edu

Home Institution: University of Puerto Rico, Río Piedras Campus **Undergraduate Major:** Molecular and Cell Biology

Science Interests: My scientific interests primarily lie in studying certain animal models' capacity to regenerate

their nervous system. However, I am also very interested in the gut-brain axis and developing a better understanding of the mechanisms underlying its effects on psychological states such as anxiety. In the future, I would like to learn to characterize microbiomes and study the effects of altering their biodiversity on a model's behavior.

Career Goals: I am still deciding whether I want to strive to join a PhD or an MD PhD program. However, I do know that I want to explore various fields of research such as microbiology, neuroscience, and marine biology. I would also like to eventually apply my research to human health and its development, although I am not yet sure in what way.

Pansée ElGhayati

Pronouns: she/her/hers

Email: pelghayati@ucsd.edu

Home Institution: University of California, San Diego

Undergraduate Major: Cognitive and Behavioral Neuroscience

Science Interests: My curiosity about the brain and my interest in psychology led me to delve even deeper into the field of neuroscience. My involvement in the STARTneuro program and my current lab, the Stowers lab, has provided me with valuable training in neuroscience techniques. This exposure has strengthened my interest to the study of neurological disorders, particularly Autism Spectrum Disorder (ASD), as I witnessed the impact it had on my younger brother's social lifestyle. Researching and unraveling the complexities of the brain has become a personal and academic drive for me.

Career Goals: I want to pursue a PhD in neuroscience to hopefully explore my interests in neurological disorders, specifically ASD (Autism Spectrum Disorder). I have worked in a lab for almost a year now and I'm really fascinated by cell and molecular approaches as well as empirical/behavioral research. I want to keep working in a lab, hopefully abroad, and expand my knowledge and skills to further research in the field.

Immanuela-Nicole Enwesi

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Home Institution: University of Maryland

Undergraduate Major and Graduation Date: Neuroscience and French , 2024

Science Interests: My science interests are developmental neuroscience, perinatal neuroscientific studies, and cognition.

Career Goals: I am interested in pursuing both academia and the medical field as an MD/PhD. More specifically, I want to focus in mother and baby health.

Joyce Escatel-Flores

Pronouns: she/her/they/them

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Home Institution: CUNY Brooklyn College

Undergraduate Major and Graduation Date: Psychology, 2024

Science Interests: My primary research interests are in the field of mental health disorders, specifically depression, bipolar disorder, schizophrenia, PTSD, and various personality disorders such as borderline personality disorder and antisocial personality disorder. I am particularly interested in exploring how these mental health disorders affect brain chemistry and which areas of the brain are affected, with the ultimate goal of

understanding ways to minimize symptoms from a neuroscience perspective, utilizing the biological and cellular realms to explore the causes of certain behaviors and emotional states.

Career Goals: My career goal is to earn a Ph.D. to become a researcher and explore my interest in psychiatric disorders.

Joyce Escatel-Flores

Pronouns: she/her/hers

Email: f.makenna@wustl.edu

Home Institution: Washington University in St. Louis

Undergraduate Major and Graduation Date: Biology: Neuroscience, 2025

Science Interests: Scientifically, I am interested in sensory systems, cognition, developmental disorders and neurodegenerative disease, and behavioral neuroscience. Currently, my research focuses on pain science; specifically, trying to validate the mouse model for peripheral cannabinoid research on humans.

Career Goals: Once graduating from Washington University, I'd like to spend one to two post-graduate years in a research-centered fellowship program. After which I hope to enroll in an MSTP program. Once completing the MSTP program, I hope to balance my time and actively integrate my research into clinical practice.

Drake Gorecki

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Email: dgorecki@hamilton.edu

Home Institution: Hamilton College

Undergraduate Major and Graduation Date: Neuroscience, 2024

Science Interests: I am interested in investigating the biological mechanisms underpinning learning and memory using mouse and rat models.

Career Goals: I am applying to grad school this cycle for a PhD in neuroscience. After that I plan on pursuing a postdoc position, and eventually becoming the PI of my own lab in addition to teaching as a professor.

Hector Haddock

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Email: hector.haddock1@upr.edu

Home Institution: University of Puerto Rico, Río Piedras Campus

Undergraduate Major and Graduation Date: Biology, 2025

Science Interests: My passion for research revolves around understanding psychiatric disorders, with a specific focus on anxiety. This interest was sparked by witnessing the profound impact of anxiety on my grandmother's life. I embarked on a journey to explore the intricacies of the brain and how its dysfunction leads to mental health disorders. Currently, my fascination lies in behavioral neuroscience, utilizing animal models to delve into anxiety disorders. I aspire to unravel the complexities of brain circuitry and function, ultimately bridging the gap between brain disorders and their effects on behavior.

Career Goals: I aim to complete my Bachelor's in Molecular Cell Biology and acquire specialized training in cutting-edge techniques like optogenetics, viral tracing, and chemogenetics. My goal is to participate in research fellowships and summer programs that offer access to these advanced methods. In the long term, I'm committed to pursuing a PhD in Neuroscience and contributing to the field of basic research. As an underrepresented scholar from Puerto Rico, I am eager to leverage programs to expand my scientific network and mentor future scholars, fostering diversity in the world of research.

Kassandra Hamiliton

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Email: kmh156@duke.edu

Home Institution: Duke University

Undergraduate Major and Graduation Date: Neuroscience, 2023

Science Interests: My scientific interests include human neuroimaging, psychopathology, speech and language, and brain computer interfaces.

Career Goals: After completing my Bachelor's in Neuroscience this December, I aim to pursue a PhD in Neuroscience. My long-term career goals include working in industry as a neuroscientist, focusing on the development of neurotechnology to aid individuals with mental illness or speech/language disorders and disability.

Maya Hawkins

Pronouns: she/her/hers

Email: mah9931@nyu.edu

Home Institution: New York University

Undergraduate Major and Graduation Date: Neuroscience, 2025

Science Interests: I am interested in the molecular and cellular biology of neurodegenerative diseases, specifically Alzheimer's Disease and Fronto-temporal Dementia. I wish to discover more about the disrupted cellular mechanisms in these processes.

Career Goals: Once I graduate from NYU, I plan to pursue a Ph.D. program in neuroscience relating to neurodegenerative disease. Eventually, I would love to teach neuroscience at a university while running my own lab to discover more about molecular and cellular neurobiological mechanisms.

Alek Helgesen-Thompson

Pronouns: he/him/his

Email: alekh@uw.edu

Home Institution: University of Washington

Undergraduate Major and Graduation Date: Electrical and Computer Engineering, 2026

Science Interests: I am interested in how Artificial Intelligence and machine learning interact with neuroscience and medicine to help people.

Career Goals: I want to become a research scientist that finds solutions to medical issues using computational skills to help people. I really want to combine complex computation with real life applications in the medical field to improve treatments and quality of life of patients.

Ryan Henry

Email: ryanhenry246@gmail.com

Home Institution: Hunter College

Undergraduate Major and Graduation Date: Psychological Physiology, 2024

Science Interests: I am interested in Cognition, Systems Neuroscience, Reinforcement Learning, Decision-making, and Perception.

Career Goals: My goal is to earn a Ph.D. in neuroscience to publish quality research that reveals answers to the processes underpinning cognitive choices but to also make this knowledge more accessible and engaging through teaching undergraduate and graduate-level courses as a faculty member within academia. I also am deeply passionate about using my position to inspire a new generation of scientists and increase science comprehension among the general public.

Madeline Hernandez

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Home Institution: University of Washington

Undergraduate Major and Graduation Date: Chemical Engineering, 2025

Science Interests: For this specific experiment, I am looking into the behavior aspects, pertaining to stress amongst mice and the effects of being in under stress induced conditions. I was more so interested in the idea of how stress impacts our bodies, and how the fluctuation in brain activity because of stress conditions. I wanted to explore this concept and how we can see the change in brain activity, and what we can decipher from this experiment.

Career Goals: My career goals, as a chemical engineering student, are to work in healthcare and pharmaceuticals working in large industry manufacturing. I would like with a company that is sustainable and affordable in terms of accessibility. I would also want to work in the business aspect of healthcare and pharmaceuticals, and reform from there.

Yana Honcharuk

Pronouns: she/her/hers

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Home Institution: Kenyon College

Undergraduate Major and Graduation Date: Neuroscience, 2024

Science Interests: I am interested in genetics, molecular and developmental neuroscience.

Career Goals: My career goals is to get a PhD.

Monica Jensen

Pronouns: she/her/hers

Email: mljensen@ucsd.edu

Home Institution: University of California, San Diego

Undergraduate Major and Graduation Date: Neurobiology, 2024

Science Interests: I am interested in memory, perception, consciousness, learning, neurodegenerative disease, and mental health.

Career Goals: My career goals are Postbac, PhD, and Industry.

Nyia Jones

Email: Nyiaj16@icloud.com

Home Institution: CUNY Brooklyn College

Undergraduate Major and Graduation Date: Psychology, 2025

Science Interests: I am interested in neurodegenerative disease, and clinical science.

Career Goals: My career goals are doing research and a PhD in neuroscience.

Noah Kabbaj

Pronouns: he/him/his

Email: kabbaj@wustl.edu

Home Institution: Washington University in St. Louis

Undergraduate Major and Graduation Date: Biology: Neuroscience, 2026

Science Interests: I am broadly interested in psychiatry and behavior, as well as in neurodegenerative disease.

Career Goals: My ultimate career goal is to become a PI in a neuroscience lab, although I am unsure exactly what branch of the field I want to study. I also want to be involved in diversity, equity, and inclusion work within academia.

Naru Kang

Pronouns: she/her/hers

Email: nnk6312@gmail.com

Home Institution: University of Maryland, College Park

Undergraduate Major and Graduation Date: Biology and Psychology, 2023

Science Interests: I am interested in studying the neural mechanisms of decision making, motivation and reward, conflict and response inhibition, and animal models of addiction.

Career Goals: I plan to attend medical school and pursue a medical career as a physician in the future.

Javier Kelly Cuenca

Email: jek4mg@umsystem.edu

Home Institution: Washington University in St. Louis

Undergraduate Major and Graduation Date: Biochemistry, 2023

Science Interests: I am interested in Behavior, Pharmacology, and Pain.

Career Goals: As a neuroscience PhD candidate, my career goal is to explore the intricate interplay between circadian rhythms, pain perception, and pharmacological interventions. My scientific interests drive me to investigate how the body's internal clock influences pain sensitivity and response to drugs. I aim to develop novel therapeutic strategies that harness the circadian system to optimize pain management and drug efficacy. This endeavor not only advances our understanding of behavior and neurobiology but also has the potential to improve the quality of life for individuals suffering from chronic pain conditions.

Nila Keri

Email: nila.keri@yahoo.com

Home Institution: University of Washington

Undergraduate Major and Graduation Date: Computer Science, 2024

Science Interests: I am interested in addiction.

Career Goals: My career goal is to work as a research or data scientist.

Penelope Lilley

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Email: plilley@uw.edu

Home Institution: University of Washington

Undergraduate Major and Graduation Date: Neuroscience, 2024

Science Interests: I am interested in how neural-technologies can be utilize for post-stroke, SCI, neurological development, and neuro-degenerative disease rehabilitation. Methods to induce neuroplasticity through top-down and bottom-up methods.

Career Goals: I have a desire to complete a PhD that will allow me to create a language paradigm learned through BCI. The aim of this research is to help bridge communication gap in those who lack language skills due to neurological disability or neurodivergence.

Tiffany Lin

Pronouns: she/her/hers

Email: tiffanylin04@gmail.com

Home Institution: CUNY Hunter College

Undergraduate Major and Graduation Date: Behavioral Neurobiology and Creative Writing, 2026

Science Interests: I am interested in the neurocircuitry underlying maladaptive approach/avoidance decision-making in substance abuse and eating disorders. The decision to pursue a reward that has been shown to have devastating consequences in past decisions suggests some inability to integrate and update information about the value of the current action, relative to future states. I'm interested in this because I think it plays a significant role in allowing perseverative addiction-like behaviors.

Career Goals: I hope to go into the field of functional neurosurgery where I can use basic science to inform clinical trials that apply deep brain stimulation to severe cases of substance abuse disorder and anorexia nervosa as a physician-scientist.

Lizbeth Liquidano Cortes

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Email: lliquidanocortes@nevada.unr.edu

Home Institution: University of Nevada, Reno

Undergraduate Major and Graduation Date: Neuroscience, 2025

Science Interests: I am interested in anything involved in cognitive neuroscience, and I also have an interest in degenerative disorders.

Career Goals: I plan to pursue an MSTP program to obtain my M.D and Ph.D. I hope to be in a neuroscience related field, hopefully pursuing a future career in neurosurgery.

Nawshin Maleeha

Pronouns: she/her/hers

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Home Institution: Macaulay Honors College at CUNY Hunter College

Undergraduate Major and Graduation Date: Psychology: Concentration in Behavioral Neuroscience, 2024

Science Interests: My scientific interests lie in continuously discovering the connections between vastly distinct

disciplines with a keen focus on furthering our knowledge of neurodegenerative disorders and medical concerns in general.

Career Goals: My career goal is a M.D./Ph.D. in Neuroscience. To mentor, conduct research in neuropharmacology, and discover the knowledge necessary for the treatment of neurodegenerative disorders among diverse populations.

Shayne Mayo

Email: shmayo@ucsd.edu

Home Institution: University of California, San Diego

Undergraduate Major: Cognitive Science with Specialization in Neuroscience

Science Interests: My scientific interests are learning how the brain works, working toward brain mapping and building an accurate and functional model of the human brain and learning about diseases and disorders of the brain.

Career Goals: My career goal is hopefully gaining a PhD in Neuroscience or Cognitive Neuroscience and beginning my research. I'll consider myself successful as long as I can contribute something meaningful to the field, I want to continue learning things that fascinate me, and provide for my family while I'm doing it.

Maylyn Mei

Pronouns: she/her/hers

Email: maylyn.mei@macaulay.cuny.edu

Home Institution: Hunter College

Undergraduate Major and Graduation Date: Psychology, 2025

Science Interests: My scientific interests are neurodevelopmental disorders, their affects on children's' social skills and ability to communicate/connect with others. I want to study these disorders through understanding structural or molecular brain differences between neurotypical and neurodivergent individuals. I hope to develop strategies that can be implemented at home or school to encourage typical socialization and relationships to neurodivergent individuals.

Career Goals: Working in a clinical lab as a psychologist would allow me to have a balance of research and direct-patient/ participant care.

David Melendez-Perdomo

Pronouns: he/him/his

Email: dmelendezperdomo@gmail.com

Home Institution: University of California, San Diego

Undergraduate Major and Graduation Date: Biochemistry, 2024

Science Interests: I'm interested primarily in mental health illnesses (such as depression, ADHD, bipolar, etc.) and the underlying neural mechanisms for how these kinds of things work. I am also interested in how internal physiological state can modify behaviors, and how this works on a neural level.

Career Goals: My career goal is to become a PI/professor or work in industry.

Rachel Membreno

Pronouns: she/her/hers

Email: rachelmembreno9@gmail.com

Home Institution: San Diego State University

Graduation Date: 2024

Science Interests: My interests lie in neuropsychology and cognitive aging particularly in testing and assessment development for clinical populations. My interest extends to cutting-edge technologies like MRI and enhancing existing methods to more effectively prevent and diagnose age-related neurodegenerative diseases.

Career Goals: I aspire to pursue a Ph.D. in Clinical Psychology, specializing in neuropsychology and continue with a research focus on neurodegenerative diseases.

Keydy Mendez

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Home Institution: Temple University

Undergraduate Major and Graduation Date: Neuroscience, 2025

Science Interests: My interest is behavioral neuroscience.

Career Goals: My career goal is a MD/PhD.

Joyce Milandu

Pronouns: she/her/hers

Email: joylmilandu@gmail.com

Home Institution: University of Maryland, College Park

Undergraduate Major and Graduation Date: Neuroscience, 2024

Science Interests: My primary interest focuses on cognitive and clinical neuroscience. I am interested in research regarding how psychopathology affects cognitive processes such as decision-making. I currently conduct research at the Clinical and Cognitive Neuroscience Lab, led by Dr. Edward Bernat, where we are assessing the shared and unique relationships that the P300 event-related potential, and the medial-frontal theta waveform have with the psychopathology “p” factor.

Career Goals: I plan to pursue an M.D/Ph.D. in Psychiatry and Neuroscience.

Sebastian Monge Reyes

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Email: sebastianmonge@wustl.edu

Home Institution: Washington University in St. Louis

Undergraduate Major and Graduation Date: Cognitive Neuroscience, 2025

Science Interests: I’m interested in neurodegenerative disorders, psychopharmacology, systems neuroscience, attention and perception.

Career Goals: My career goal is to pursue an MD/PhD in neurosurgery and neuroscience.

Sara Morcos

Pronouns: she/her/hers

Email: smorcos@bowdoin.edu

Home Institution: Bowdoin College

Undergraduate Major and Graduation Date: Neuroscience, 2024

Science Interests: My science interests are neuropathology, neurology, neurodegenerative disease, epidemiology/pathology, pediatrics, gynecology, and ophthalmology.

Career Goals: I plan to pursue an M.D/Ph.D. in Medicine.

Tendayi Mpofu

Email: empofu@lsuhsc.edu

Home Institution: Xavier University of Louisiana

Undergraduate Major and Graduation Date: Neuroscience, 2024

Science Interests: My science interests are neurodegenerative disease/injury and sports related brain injuries.

Career Goals: I would like to become a sports medicine physician.

Emma Nicolaysen

Pronouns: she/her/hers

Email: enicolaysen5@gmail.com

Home Institution: Michigan State University

Undergraduate Major and Graduation Date: Neuroscience and Economics, 2025

Science Interests: My research interests are tied to health disparities, with a special focus on healthcare access among rural communities. My research in the Vega Lab has been focused on connections between underrepresented populations in healthcare and diagnosis methods for cognitive impairment. I am also involved in policy research through Michigan State's Institute for Public Policy and Social Research, where I focus on differences in healthcare policy within and between states across the US. I am interested in these differences and what they tell us about social determinants of healthcare and mechanisms we can affect to direct positive health outcomes.

Career Goals: After graduation, I hope to pursue a PhD and enter a graduate-level Neuroscience program. I plan to go into the field of neuroeconomics and begin work as a research assistant or laboratory technician. From there, my goal is to work as a pharmaceutical sciences manager or health educator, researching and implementing the most effective ways to decrease health disparities between rural and urban communities. As my research interests are connected to healthcare access, I am deeply invested in a career path that will allow me to bring science and policy together to combat health disparities across the country.

Megan Niehaus

Pronouns: she/her/hers

Email: menzx8@mail.umsl.edu

Home Institution: University of Missouri - St. Louis

Undergraduate Major and Graduation Date: Psychology, 2024

Science Interests: I am interested in using a biopsychosocial framework to research psychological phenomena. I have studied the effects of inflammation on cognition in a longitudinal aging model, as well as in perinatally infected HIV+ youth.

Career Goals: I either want to be a career researcher in a neuropsychological field, or take my health psychology background and apply it to clinical psychology. I have also been interested in clinical neuropsychology.

Lewis Nune Severino

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Home Institution: Hunter College

Undergraduate Major and Graduation Date: Psychology, 2024

Science Interests: I am interested in the understanding how prior experiences shape motivation and decision-making, specifically by looking at neural mechanisms of cognitive processes like memory.

Career Goals: With a passion for teaching and fostering diversity in science, my goal is to pursue a career as an academic neuroscientist.

Stephanie Ortiz Espaillat

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Home Institution: University of Puerto Rico, Río Piedras Campus

Undergraduate Major and Graduation Date: Cellular Molecular Biology, 2025

Science Interests: I am interested in behavioral neuroscience related to memory and neurodegeneration.

Career Goals: As of now, my career interests are to pursue a PhD in neuroscience to help educate our community and encourage Afro-Carribean women to join STEM careers.

Alejandra Isabel Pacheco Balzac

Pronouns: she/her/hers

Email: apachecobalzac@pucpr.edu

Home Institution: Pontificia Universidad Catolica de Puerto Rico

Undergraduate Major and Graduation Date: Biology, 2024

Science Interests: I am deeply intrigued by neuroscience due to its captivating exploration of the intricate workings of the human brain. The brain, a remarkable organ, is the seat of our thoughts, emotions, and consciousness. Understanding its complexity holds the key to unraveling the mysteries of our existence. My fascination with neuroscience lies in its potential to unlock the secrets of neurological disorders, enhance mental well-being, and even redefine our understanding of human cognition and consciousness. The prospect of contributing to groundbreaking discoveries in this field and ultimately improving the lives of individuals with neurological conditions is a driving force behind my passionate interest in neuroscience.

Career Goals: Becoming a neurosurgeon is my unwavering aspiration, ignited by a profound desire to directly impact lives through the intersection of medical expertise and neuroscience. The intricate, delicate nature of the human brain, coupled with its central role in our existence, captivates me. The idea of being at the forefront of treating neurological disorders, relieving pain, and restoring functionality is a calling I cannot ignore. The blend of precision, innovation, and profound human connection within neurosurgery is both challenging and immensely rewarding. I am driven by the prospect of making a tangible difference in the lives of patients, cementing my resolve to dedicate myself to this demanding yet gratifying field.

Dakota Pashanova

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Home Institution: CUNY Brooklyn College

Undergraduate Major and Graduation Date: Psychology, 2025

Science Interests: I'm interested in researching the conscious and subconscious, as well as psychedelics, personality disorders, and autism. I want to approach learning about how the human brain and mind work through a mixture of psychology, neuroscience, and philosophy.

Career Goals: My career goals are flexible but an overarching theme is that I want to continue learning even when I'm finished with my PhD.

Kayla Pereira

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Home Institution: Temple University

Undergraduate Major and Graduation Date: Neuroscience, 2025

Science Interests: My scientific interests are in Neurological disorders and and the ability for medicine to overcome these disorders and treat patients.

Career Goals: My career goal is to be accepted into medical school and hopefully become a surgeon.

Leo Pereira Sanabria

Email: pereir53@msu.edu

Home Institution: Michigan State University

Undergraduate Major and Graduation Date: Neuroscience, 2025

Science Interests: I am interested in molecular and cellular mechanisms of learning and memory.

Career Goals: I want to pursue a PhD in Neuroscience with the hopes of establishing my own lab and learn more about learning and memory and how I can use science to help people that I care about.

Matthew Piniero

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Email: tun41426@temple.edu

Home Institution: Temple University

Undergraduate Major and Graduation Date: Neuroscience and Psychology, 2024

Science Interests: I am interested in molecular and cellular neurobiology. Specifically, I am interested in the areas of substance use disorder and developmental neuroscience.

Career Goals: I would like to pursue a Ph.D. in neuroscience and continue doing research, focusing on the molecular and cellular basis of neurological diseases.

Trinidi Prochaska

Email: prochaskat@wustl.edu

Home Institution: Washington University in St. Louis

Undergraduate Major and Graduation Date: Biology: Neuroscience, 2023

Science Interests: My scientific interests are reproductive physiology, GPCR trafficking, maternal and fetal outcomes, uterine contractility, and neuroendocrinology.

Career Goals: My career goal is to Obtain a doctoral degree and become a research scientist.

Joel Rejouis

Email: joelrejouis91@gmail.com

Home Institution: Brooklyn College

Graduation Date: 2024

Science Interests: I am interested in behavioral neuroscience, neurophysiology, neuroanatomy, and neurology.

Career Goals: Currently, my career goals revolve around enrolling in a graduate program that can provide me with the necessary training and practical experience required to secure a role focused on the physiological aspects of the brain, particularly in the context of brain damage.

Alexis Reed

Email: alexis.reed@lion.lincoln.edu

Home Institution: Lincoln University of Pennsylvania

Undergraduate Major and Graduation Date: Biology, 2024

Science Interests: My Scientific Interests are both Neurology and Dermatology. I look forward to going to medical school after completing my Undergraduate Degree.

Career Goals: I would like to become a neurology and dermatology.

Sidney Retama-Candelario

Pronouns: she/her/hers

Email: sidneyabigail18@gmail.com

Home Institution: North Carolina Central University

Undergraduate Major and Graduation Date: Chemistry and Psychology, 2026

Science Interests: I am interested in treating and researching traumatic brain injury and PTSD. I am also interesting in tau protein research.

Career Goals: I plan on earning my PhD and going to med school for my MD. My plan is to become a physician-scientist.

Catrina Reyes

Email: catrinadr19@gmail.com

Home Institution: Washington University in St. Louis

Undergraduate Major and Graduation Date: Cognitive Neuroscience, 2023

Science Interests: I am interested in Developmental Neuroscience.

Career Goals: My career goal is getting a MD/PhD.

Camille Reynoso Fernandez

Pronouns: she/her/hers

Email: camillepatricia250@icloud.com

Home Institution: CUNY Brooklyn College

Undergraduate Major and Graduation Date: Psychology, 2024

Science Interests: Some of my scientific interests are: studying human behavior and emotions. I'm a very curious person and right now I'm enjoying the opportunity to understand the causes and treatments of neurological

disorders, hopefully seeking to make a positive impact on the lives of those affected in the future. I'm interested in unraveling the complexities of memory, perception, and consciousness. 100 words are not nearly enough to talk about all of my interests but I'll end it by saying that for me, they are mostly driven by the desire to contribute to the betterment of society through the scientific advancement of neuroscience and psychology.

Career Goals: I have a very active mind and I can't seem to leave a question without answer so, in the future, I hope to unlock the mysteries of the human mind. I envision a future where I'm a neuroscientist, and contribute to a deeper understanding of our thoughts, behaviors, and the intricacies of the brain. I want to explore the frontiers of human cognition, mental health, and neurobiological mechanisms. I feel like mostly, my career goals resonate with the pursuit of knowledge and wanting to improve the lives of individuals facing neurological and psychological challenges.

Natalia Rincon

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Home Institution: University of Maryland, College Park

Undergraduate Major and Graduation Date: Psychology, 2024

Science Interests: I am interested in neuropsychopharmacology, clinical/translational neuroscience, clinical drug trials, alcohol use disorder, substance use disorder, neuroimaging, fMRI, MRI, gut-brain axis, gut microbiome, structured clinical interviews, sample collection, and pharmacological treatment.

Career Goals: I want to obtain a PhD in neuroscience and contribute to research in areas focusing on alcohol use disorder, pharmacological treatment, and the gut-brain axis.

Luz Beatriz Rivera Agosto

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Home Institution: University of Puerto Rico, Río Piedras Campus

Undergraduate Major and Graduation Date: Cellular-Molecular Biology, 2025

Science Interests: I am interested in the study of neurodegenerative diseases or simply diseases related and or modulated by the nervous system. I am highly interested in the mechanisms of action by which these diseases affect the nervous system.

Career Goals: I am interested in pursuing a research career in which I can link cancer biology and neurobiology. I want to find new therapies to target diseases related to the nervous system. My future goal is to become a Ph.D and dedicate my life to the generation of new knowledge and the analysis of it.

Angelys Rivera Hernández

Email: angelys.rivera4@upr.edu

Home Institution: University of Puerto Rico, Río Piedras Campus

Undergraduate Major and Graduation Date: Biology, 2025

Science Interests: I am excited to continue working on behavioral neuroscience. Within that field of behavioral neuroscience, I have always been fascinated with studying and correlating the behavior of serial killers with neural diseases or conditions.

Career Goals: I am interested in completing a Ph.D. degree in Neuroscience. Also, I plan to make contributions to my Puerto Rican scientific community.

Amanda Rodríguez

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Email: amanda.rodriguez24@upr.edu

Home Institution: University of Puerto Rico, Río Piedras Campus

Undergraduate Major and Graduation Date: 2024

Science Interests: My science interests are neuroscience, neurogenesis, tumorgenesis, vascular system, neurodevelopment disorders.

Career Goals: My career goals include postbaccalaureate, MD-PhD.

Fabiana Rosado Rodríguez

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Email: fabiana.rosado@upr.edu

Home Institution: University of Puerto Rico, Río Piedras Campus

Undergraduate Major and Graduation Date: Psychology, 2025

Science Interests: As a psychology student, I am interested in researching topics that affect the well-being of individuals. At a social level, drug addiction is one of the problems that most affects people, taking away their quality of life. Therefore, my interest is studying and understanding the biological components of drug addiction. Specifically, I would like to research opioids and analyze the contextual factors at a social level that contribute to these addictive behaviors becoming more common each year.

Career Goals: I would like to continue my graduate studies in neuroscience and psychology or to be able to practice as a neuropsychologist. My plans are to do a PhD and be able to do much more research on opioid addiction, always taking into account the psychological and social aspect that surrounds this problem. I am very interested in working with people who have problems with substance abuse and helping them regain their well-being. Even so, I do not rule out being able to work with other topics such as neurodegenerative diseases.

Michelle Ruiz

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Email: mruizvelazquez@nevada.unr.edu

Home Institution: University of Nevada, Reno

Undergraduate Major and Graduation Date: Psychology, 2024

Science Interests: My primary research interests include schizophrenia and autism, specifically with how they both develop over time and potential biomarkers. I'm always interested in learning new things in neuroscience and have recently been very interested in learning more about the research in aphasia.

Career Goals: My goal is to pursue a Ph.D. in cognitive neuroscience and to go into academia and continue doing research in neuroscience!

Caleb Ryce

Email: calebryce22@gmail.com

Home Institution: University of Nevada, Reno

Undergraduate Major and Graduation Date: Neuroscience, 2024

Science Interests: I am interested in researching the cellular mechanisms and cell cycle of cancerous cells in glial tumors of the brain. More specifically, how these cells avoid the intended processes of the cell cycle such as the G_0 phase, and programmed cellular death. I have gained skills that will help me with my future endeavors such as

becoming well acquainted with light, fluorescent, and imaging microscopy during my time spent in Ann Arbor, as well as performing cell cultures, micro-dissections, and transfections at UC Davis.

Career Goals: Following my graduation in 2024, I plan on pursuing an MSTP program in hopes of obtaining both an MD and Ph.D. I hope to be in a neuroscience related medical field, so that I will be able to have my research of interest coincide with my everyday work. I hope to serve as an example for other young black men in STEM, as I know we account for a very small population in both research and the medical field.

Taliana Salcedo

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Home Institution: University of Puerto Rico Bayamón

Undergraduate Major and Graduation Date: Biology Human Focus, 2025

Science Interests: My scientific interest are neuroscience, neurocircuits, behavior, glias, and cells.

Career Goals: I want to pursue an MD-PhD, as it will allow me to combine clinical experience with research.

Samir Samadov

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Home Institution: Brooklyn College

Undergraduate Major and Graduation Date: Neuroscience and Psychology, 2024

Science Interests: I am interested in Computational Neuroscience

Career Goals: My career goals is to stay in academia.

Mohammed Serri

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Home Institution: CUNY Brooklyn College

Undergraduate Major and Graduation Date: Biology, 2025

Science Interests: I am interested in everything related to neuroscience: from brain, behavior, cognitive to hormones and how they affect the body.

Career Goals: My career goals is to research in related topics to my interests.

Safa Sheik

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Home Institution: CUNY Hunter College

Undergraduate Major and Graduation Date: Biology, 2024

Science Interests: My primary focus is the relationship between early life experiences and later life outcomes in children. I'm interested in the interplay between the amygdala and the prefrontal cortex—critical emotion regulation and decision-making regions. My goal is to understand how these neural pathways evolve during development and how they influence cognitive, emotional, and behavioral outcomes in later life. By studying these neural correlates, I aim to provide valuable insights for the neuroscience community and suggest potential interventions to foster optimal child development.

Career Goals: I aim to pursue an MD-PhD with a focus on pediatric psychiatry. I want to understand and treat childhood psychiatric conditions. By integrating clinical work with research, I intend to investigate the root causes and develop effective interventions for children's mental health. My goal is to connect real-world clinical observations with in-depth research.

Brooke Shulski

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Home Institution: Temple University

Undergraduate Major and Graduation Date: Psychology, 2025

Science Interests: My scientific interests are in the development of psychopathology, forensic psychology, and risk-taking behavior in juveniles.

Career Goals: My career goal is to work as a researcher in correctional facilities to discover ways to try and make the corrections system work more effectively.

Aysha Smith

Email: ayshamariesmith02@outlook.com

Home Institution: University of Arizona

Undergraduate Major and Graduation Date: Psychology Science, 2024

Science Interests: My scientific interests are Reproductive Science and Pathology, Neuropsychology, Developmental Psychology, Neurodevelopment and Pathology, Scientific Design and Communication, Integrative and Multidisciplinary Research, and Integrative and Alternative Medicine.

Career Goals: My career goals are to enroll into a post-bac program to prepare for an MD-PhD, work in a hospital or clinical research setting in order to gain more research experience and expand interests, enroll into a post-bac certification program focused on Applied Behavioral Analysis and work towards getting a certification to become an Assistant Behavioral Analyst, and become certified in DBT and other integrative practices.

Emma Stauffenberg

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Home Institution: University of Nevada, Reno

Undergraduate Major and Graduation Date: Psychology, 2025

Science Interests: My scientific interests are in signaling pathways in glial cells and how hormones affect specific cells.

Career Goals: My career goal is to obtain a Ph.D. and possibly become a primary investigator or teach in a liberal arts college.

Christopher Stein

Email: cbstein@gmail.com

Home Institution: Hunter College

Undergraduate Major and Graduation Date: Psychology, Neuroscience Concentration, 2024

Science Interests: I am interested in the protein trafficking relationships in the rod photoreceptor which lead to retinitis pigmentosa, as well as the affects LSD and psilocybin can have in adulthood, after experiences of depression and abandonment in adolescence.

Career Goals: I intend on dividing my time between teaching and research; and I hope the research I am able to conduct will contribute to the treatment of PTSD, as well as disorders of depression and anxiety.

Penelope Stuart-Hurtado

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Home Institution: The University of Arizona

Undergraduate Major and Graduation Date: Neuroscience and Cognitive Science, Linguistics, Arabic, 2024

Science Interests: I am interested in molecular neurobiology. I particularly enjoy working with methods such as optogenetics and DREADDs and exploring the mechanisms underlying consciousness, cognition, and perception.

Career Goals: I intend to pursue a PhD in neuroscience, following which I would like to continue a career in neurobiological research exploring topics in consciousness and cognition.

Leilani Taiano

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Home Institution: Temple University

Undergraduate Major and Graduation Date: Neuroscience and Anthropology, 2024

Science Interests: My scientific interests include research about the onset of Psychopathologies-- particularly Psychosis, personality disorders, eating disorders and alcohol abuse disorders. I enjoy using tools such as neuroanatomy, behavior and cognition to arrive at conclusions that can help elucidate what risk factors exist for these types of Psychopathologies. At the Ellman Laboratory, the laboratory I currently work in, our main research interests focuses on the risk factors for psychosis, and we utilize the aforementioned tools to elucidate this; in addition, we are starting to look at biomarkers that can exist in samples such as blood.

Career Goals: As of currently, I am interested in pursuing research in the domain of psychopathological Neuroscience. While I love research as a process, if it proves to not be the path I wish to pursue in future years, I will consider pursuing Physicians Assistant school instead. Being also that I am an Anthropology major, if I find out that quantitative research or medical field are paths I wish to pursue, I may want to integrate Anthropological research methods as a way of studying human beings. At the end of the day, I am interested in the study of people.

Tyara Thompson

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Home Institution: The College of Wooster

Undergraduate Major: Cognitive Behavioral Neuroscience

Science Interests: I am interested in pursuing a Ph.D. in Neuroscience to investigate the effect of living in food deserts on brain development and behavior.

Career Goals: I would like to eventually become a PI or a professor at a small liberal arts college.

Giancarlo Tirado

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Email: giancarlo.tirado@upr.edu

Home Institution: University of Puerto Rico, Río Piedras Campus

Graduation Date: 2025

Science Interests: The ventral tegmental area (VTA) is linked to reward processing, learning, and memory. By blocking long-term potentiation (LTP) in the VTA, the normal strengthening of synaptic connections in the VTA-NAc pathway, the interface between motivation and action, is inhibited. Altering signaling and neuronal activity between these regions, and therefore the reward circuit. Understanding the mechanisms underlying cocaine-evoked plasticity and the role of LTP in the VTA-NAc pathway is key to developing specific interventions by modulating synaptic plasticity and the reward circuitry involved.

Career Goals: Thanks to my mentor and graduate students, I realized that drug abuse is a broader aspect than I thought. That is why after graduate school I plan on studying neuroscience and dedicate my life to understanding destructive human behavior by studying neurobiology behind them. In the future, I hope to work with Dr. Jimenez to find an experimental treatment that could disrupt cocaine addiction in humans. Through an understanding of cognitive processes related to decision-making and the function of brain structures, neurotransmitters, neurochemicals, and epigenetic predispositions we can hope to reduce human destructive behavior in our community.

Iliana Todorovski

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Home Institution: Temple University

Undergraduate Major and Graduation Date: Psychology BA, 2023

Science Interests: Studying social anxiety in adolescents is crucial because heuristics associated with it can lead to comorbidity of other mental health disorders and the impairment of every day functioning. Previously in our lab, we found a correlation between more severe social anxiety symptoms and remembering social feedback as more negative than positive. I am interested in investigating if social support could moderate this relationship since literature suggests social support to be a protective factor for psychopathology and may improve self-esteem.

Career Goals: My experiences in the research world have been really inspiring, and they've led me to further pursue helping individuals in a clinical setting. So I am currently exploring graduate school options in mental health counseling.

Pedro Torres Morales

Email: pedro.torres26@upr.edu

Home Institution: University of Puerto Rico-Cayey

Undergraduate Major and Graduation Date: Biology, 2024

Science Interests: My scientific interest is in neuroscience. My research work is interested in studying thalamocortical neurons in the mouse dorsal lateral geniculate nucleus.

Career Goals: My career goals are to learn more about science and help my community and other underrepresented communities.

Cristal M. Torres Rodriguez

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Email: cristal.torres3@upr.edu

Home Institution: University of Puerto Rico, Río Piedras Campus

Undergraduate Major and Graduation Date: Biology, 2024

Science Interests: My scientific interests are deeply rooted in the integration of Systems Neuroscience and

Cell Biology, as I am fascinated by the synergy between the cellular intricacies and the complex circuitry of the nervous system. Understanding the behavior of individual neurons and glial cells at the cellular and molecular level through Cell Biology techniques is crucial for unraveling the fundamental mechanisms of neural activity. Simultaneously, Systems Neuroscience provides me with the tools to explore how these individual components interact and form functional networks, giving rise to cognitive processes and behaviors. This dual focus allows me to appreciate the nervous system as a whole, from the granular details of cellular function to the emergent properties of neural circuits, and fuels my curiosity in deciphering the mysteries of brain function and dysfunction.

Career Goals: I want to pursue either an MD/PhD or a PhD in the field of Neuroscience, as I am deeply passionate about advancing our understanding of the brain and developing innovative therapeutic strategies for neurological conditions.

Daniela Umana

Pronouns: she/her/hers

Email: daniela.umana@upr.edu

Home Institution: University of Puerto Rico, Río Piedras Campus

Undergraduate Major and Graduation Date: Cellular Molecular Biology, 2025

Science Interests: Neuroscience is constantly expanding by bringing a different perspective to topics. Looking at the brain's complex system that has been reduced to its simple electrical current brings me a sense of astonishment. It can even be applied to chemistry, psychology, or medicine, demonstrating neuroscience's interdisciplinary nature. What I found most intriguing was its clinical approach to cognitive neuroscience treating mental illness in society. However, the only way to properly try to explain the mysteries of the brain is through investigation. My interest in studies stems from asking questions, which can create new knowledge.

Career Goals: I am an undergraduate studying Cellular Molecular Biology at the University of Puerto Rico, Rio Piedras. Joining the Carmen Maldonado labs has opened my interest in research in neuroscience. This investigation opportunity has reawakened my passion for neuroscience and given me valuable research experience. So far in the laboratory, I have learned that success and setbacks go together. However, research is a challenge I am willing to take on. I desire to further the research skills necessary for my MD/Ph.D. journey because people can always continue to improve and acquire new knowledge.

Manuel Vasconcelos

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Email: jvasconcelos@ucsd.edu

Home Institution: University of California, San Diego

Undergraduate Major and Graduation Date: Cognitive and Behavioral Neuroscience, 2024

Science Interests: I am interested in understanding how psychedelics influence behavior and lead to short and long term changes in the nervous system. Psychedelics have been shown to influence valence processing by altering representations of negative stimuli. This coincides with my interest in the acute perceptual changes driven by the psychedelic experience itself. My goal is to understand the importance of the acute psychedelic experience and asses its influence on therapeutic potential.

Career Goals: I want to finish my current degree and gain experience working as a lab technician to understand how experimental paradigms are designed as well as all of the technical skills used to carry out a hypothesis. I want to use this knowledge to help create technologies to mediate the psychedelic experience.

Marivelisse Velazquez

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Home Institution: Pontifical Catholic University of Puerto Rico

Undergraduate Major and Graduation Date: Biomedical Sciences, 2024

Science Interests: I have an interest in Biology, but I'm centered specifically in Neuroscience. My experiences and knowledge from classes, labs, conferences and papers have opened a curiosity in me to learn more about neurodegenerative diseases. How they come to happen, what is known about them and what is being done to help those who suffer from them. I'm also interested in Astronomy. I find space and everything that's part of it to be fascinating. I've always thought that the unknown is worthy of study. There is always something new to learn and understand.

Career Goals: I learned about research in my home university. I was given the opportunity to work in Neuroscience. Thanks to that experience, I developed a passion for Neuroscience research. It led me to decide to pursue a PhD in Neuroscience. My goals are to be accepted in graduate school, expand and obtain knowledge and skills, obtain a PhD and get a job where I can apply everything I know, challenge myself and learn new things. Hopefully, I will be able to help others through my research.

Ricardo Vera-Sánchez

Email: rickyvera2002@gmail.com

Home Institution: University of Puerto Rico, Río Piedras Campus

Undergraduate Major and Graduation Date: Cellular and Molecular Biology, 2024

Science Interests: I am fascinated by the field of neuroscience and intrigued by the human brain and the connectome, which is a map of all the connections between the neurons in the brain. It allows the possibility to navigate the entire human brain by understanding its functional connections. I am specifically passionate about understanding the mechanisms involved in behavior. This is because understanding mechanisms underlying basic behavior may help towards finding treatments for mental illness. I want to use connectomic techniques to analyze the connectivity between neurons that control behavior to gain insight into its mechanism and eventually help treat mental illness.

Career Goals: My short-term goal is to earn a B.S. in Biology and gain expertise in neuroscience at the University of Puerto Rico–Río Piedras by conducting research with my mentors, graduate student Yamil Miranda-Negrón and Professor José García-Arrarás. My long-term goals are to become a neuroscience Ph.D. student at Harvard University and become a professor to conduct research in neuroscience and develop novel therapeutics. The SfN conference can help me attain my goals by integrating me into the scientific community through seminars and workshops, by providing me with additional peers and mentors, and by allowing me to present my neuroscientific research.

Bryanna Vilnaigre

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Home Institution: New York University

Undergraduate Major and Graduation Date: Neural Science, 2025

Science Interests: My scientific interests are neurodegenerative diseases, learning and memory, mechanisms behind memory consolidation, glia, and neuro-immune system.

Career Goals: My career goal is to obtain a PhD in Neuroscience and to further discover the avenues I can take with that degree beyond starting my own lab.

Glen Wickersham

Email: gwickersh72@sagrado.edu

Home Institution: Universidad del Sagrado Corazon

Undergraduate Major and Graduation Date: Biotechnology, 2024

Science Interests: I am interested in researching regenerative neuroscience in mammals and performing comparative biology or psychology between other organisms and mammals. In this effort, I am interested in exploring biophysical, bioinformatics, machine learning models and engineering principles in the neurobiological field to explore this further.

Career Goals: I aspire to complete a PhD in Neuroscience and Engineering, that enables me to continue research in my scientific interests and prepares me to engage several industrial and academic research problems. Simultaneously, I hope to contribute to outreach programs by creating an interdisciplinary student led research program for high school students focused in neuroscience in Puerto Rico.

Linisa Williams

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Home Institution: University of California, San Diego

Undergraduate Major and Graduation Date: Clinical Psychology, 2024

Science Interests: My scientific interests are anxiety/fear based psychiatric disorders and epigenetic predisposition for substance abuse and mental illness in the African American community.

Career Goals: My career goal is be a counselor and Psychopathologist with expertise in trauma and cultural sensitivity.

J. Olivia Young

Pronouns: she/her/hers

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Home Institution: University of California, San Diego

Undergraduate Major and Graduation Date: Neurobiology, 2024

Science Interests: My scientific interests include the neurophysiology of mood, language, and mentally healthy versus mentally ill humans. I am also interested in the public health applications of each of these areas.

Career Goals: My career goals are to obtain my PhD, work as a scientist, and perhaps become a professor and/or PI. I am also interested in becoming an advocate for the everyday, general uses of neuroscience in public health.

ENDURE SCHOLAR ABSTRACTS

Bryson Aldridge

Research Experience Institution: Louisiana State University Health Science Center- New Orleans

Research Mentors: Chunlai Wu

Project Title: A fly model to study PPP2R5C/PPP2R5D-linked intellectual disability-behavioral analysis

Project Abstract: Studies in intellectually disabled patients have identified a series of missense and deletion mutations in human *PPP2R5C* and *PPP25RD* genes. *PPP2R5C* and *PPP25RD* encode the B' regulatory subunit of PP2A, and they share a single homologous gene in fruit fly named *well-rounded*

(wrd). The Wu lab's studies on *wrd* demonstrated that the synaptic master organizer Liprin-α recruits Wrd to the synapses, where Wrd-PP2A mediates dephosphorylation events crucial for structural plasticity at the nerve terminals. Loss of *wrd* function reduces the size of the presynaptic terminal, destabilizes active zones at the larval glutamatergic neuromuscular junctions, diminishes light-induced remodeling of active zones at the photoreceptor synapses, and impairs gustatory learning in the adult. Together, these data not only provided insight into the synaptic functions of *PPP2R5C* and *PPP25RD*, and how their dysfunctions cause defects in cognitive functions, but also established a fly model to study PPP2R5C/PPP2R5D-linked intellectual disability (ID). The Wu lab has generated wild type *wrd* transgene and mutated wrd transgenes each mimicking the corresponding mutations identified in PPP2R5C/PPP2R5D-linked ID patients. My research project will first establish the rescue of *wrd* mutant phenotypes at the larval NMJs and behavioral impairments by the wild type *wrd* transgene. I will then perform the same rescuing experiments using *wrd* transgenes each carrying a mutation/deletion mimicking those identified in the human *PPP2R5C/PPP25RD*-linked ID patients. These analyses will discover how the PP2A B' subunit regulates synaptic structure and function and define the molecular etiology of PP2A-linked ID. Such knowledge can also be used to guide both genetic and pharmacological approaches to restore cognitive function in ID patients.

Giovanna Arantes de Oliveira Campos

Research Experience Institution: Temple University

Research Mentors: Dr. Nora Newcombe, Dr. Ingrid Olson

Project Title: Does the fornix support episodic memory and spatial navigation throughout development? A DTI investigation

Project Abstract: Episodic memory and spatial navigation both depend on medial temporal lobe structures including the hippocampus, as well as the white matter tracts that connect them. The chief hippocampal input/output tract is the fimbria-fornix. Several studies have found correlations between fornix microstructure and episodic memory in adults, but fewer have investigated this relationship in children. Additionally, the literature on human navigation and the fornix is virtually non-existent. In our study, children (N=43; 8-13 years) and young adults (N=39; 19-31 years) were taken on a tour of a floor of our building, combining a real-world navigation experience with episodic events. On the second day of testing, participants underwent a diffusion weighted MRI scan. Linear modelling revealed that spatial navigation performance significantly correlated with better episodic recall, with adults recalling more events than children. Diffusion tensor imaging analyses are ongoing, using probabilistic tractography to isolate the fornix and arcuate fasciculus (control tract). We will run multilevel linear models with microstructure metrics interacting with age predicting spatial composite score and episodic memory variables, individually. Preliminary results will be presented. We hope to, at the behavioral and neural levels, further tease apart the nuances of this interconnected network and track its developmental trajectory.

Mary Avella

Research Experience Institution: Brown University

Research Mentors: Matthew Nassar

Project Title: How Does Attention to Detail Update Our Way of Learning in the Face of Change?

Project Abstract: Autism Spectrum Disorder is a neurological disorder that affects how a person communicates and interacts with others. One way people on the spectrum are different from neurotypical people is by paying close attention to detail instead of looking at "the bigger picture". One way these contrasts manifest is through learning, where attention to detail might reflect focusing attention on the most recent information, rather than integrating over longer time periods. Because neurodiversity is a wide spectrum, it is hard to measure the difference between every autistic and normal learning style. Previous work from the Nassar lab has identified relationships between "attention to detail, " as measured by the autism spectrum questionnaire, and specific learning strategies that are overly focused on specific data points. This work was conducted as

part of a small in-person study, and we hope to conduct a larger, online study to validate and extend the results. To do so, we used an online video game experiment to analyze how people learned based on the movements and changes on the screen. The video game measured how participants moved a bucket to catch money dropped by an invisible helicopter. The participant had to infer where the helicopter was, so they could catch the money to earn points. The movements of the helicopter once each new trial started varied between similar patterns and spontaneous movements, so we could measure how people would decide on where to move the bucket. We have a working,

online version of the task and plan to collect behavioral data and measures of attention to detail using an Autism Spectrum Questionnaire. The data that we collect will allow us to examine the similarities and differences in learning styles of autistic people to better understand the complexity of ASD.

Kailyn Butler

Research Experience Institution: Michigan State University

Research Mentors: Jenna Lee and Alexander Johnson

Project Title: Lateral Hypothalamic Cells Projecting to the Dorsal Motor Nucleus of the Vagus

Project Abstract: Following the ingestion of food, nutrients food into the body, Cephalic phase insulin release (CPIR) is a brain derived mechanism that helps regulate energy (glucose) levels following the ingestion of food. CPIR reflects brain release of insulin prior to the absorption of glucose in the periphery. However, little is known about brain circuitry controlling CPIR. Prior research from our laboratory has identified a subset of LHA neurons that project to the dorsal motor nucleus of the vagus (DMNV). This brain region is critical for integrating parasympathetic information to regulate appetite control and CPIR. In this study, we evaluated the necessity of LHA_o DMNV neurons in the control of CPIR via a chemogenic approach to selectively inhibit this circuit during CPIR testing. In order to accurately identify cells that project to the DMNV, a dual-viral tracing approach was used. Male and female rats were injected with a retrograde AAV2 containing Cre recombinase transgene into the DMNV. Furthermore, a Credependent virus containing an inhibitory DREADD and labeled with mCherry was injected throughout the rostral-caudal area of the LHA. Cells in the LHA that project to the DMNV can be inactivated following the administration of the ligand, clozapine-N-oxide (CNO) Using this circuit-specific manipulation of LHA_o DMNV neurons, we evaluated if CNO administration would attenuate the anticipatory rise of insulin during a CPIR test. Blood glucose and insulin samples were collected at baseline, 3, 10, 20, 40, and 60 minute timepoints following sucrose consumption under control and CNO conditions. In order to analyze this possible phenomenon an Enzyme-Linked Immunoassay (ELISA) will be used to measure the amount of insulin in blood plasma at each time point to establish whether this changed as a result of LHA –DMNV neuronal activation. In this study we aim to provide insight in to the brain circuitry controlling CPIR and efficient glucoregulation. Findings can inform how the brain regulates blood glucose and offers potential targets for the treatment of disruptions in glucoregulation such as that seen with diabetes.

Victoria Cadena

Research Experience Institution: Washington University in St. Louis

Research Mentors: Dr. Maria Catalina Camacho

Project Title: Neural Emotion Differentiation is Associated With Self-Regulation in Children

Project Abstract: Linguistic emotion differentiation has been linked with emotion regulation in children, however, the relationship between neural emotion differentiation and self-regulation remains unclear. To characterize this association, we used fMRI data and self-report measures of anxiety and depression from the Healthy Brain Network (HBN) Biobank (n=823). Activation maps for specific emotions (angry, happy, sad, fearful, excited) were derived from the fMRI data (Camacho et. al., 2023) and used to quantify neural emotion differentiation scores. To generate emotion differentiation scores, pairwise correlations between activation maps for negative emotions (e.g., anger vs. fear) were calculated and the three pairwise correlations were averaged to obtain one negative emotion differentiation score. In addition, the mean absolute differences between activation maps for negative emotions were also calculated and the three pairs of differences were averaged again to obtain one differentiation score. We used general linear models to analyze the association between neural emotion differentiation scores and self-report measures of anxiety and depression, which were obtained from questionnaires. We first conducted the analysis for the whole brain, and later repeated the same analysis in specific networks by calculating differentiation scores within each network. We found that higher differentiation scores between the activation maps were associated with lower anxiety (correlation: $r = -0.104$, $p = .035$; mean absolute difference: $r = -0.146$, $p = .002$) and depression (correlation: $r = -0.104$, $p = .028$; mean absolute difference: $r = -0.075$, $p = .113$) across the whole brain. This suggests that neural emotion differentiation could underlie the association between linguistic emotion differentiation and self-regulation. Network-based analyses showed that networks like the cingulo-opercular network and areas in the medial temporal regions, that have been previously linked with anxiety and depression, had a significant association between differentiation and anxiety or depression. These findings could help reveal information on how emotion differentiation and regulation are represented in the brain and provide further insight to study how emotion dysregulation occurs in children.

Anthony Campuzano

Research Experience Institution: University of Washington

Research Mentors: Adam Gordon-Fennell, Garret Stuber

Project Title: Dopamine Signaling Across the Striatum During Consumption

Project Abstract: Animals must consume energy to survive, leading to varied consumption behaviors mediated in part by the dopaminergic system. The dopaminergic system and its plays a crucial role in learning and motivation through its projections to multiple downstream structures including subregions of the striatum. Previous data shows that the connectivity of the midbrain dopamine projections to the ventral striatum (VS), dorsal striatum (DS). Fiber photometry was performed in head-fixed mice at rest to simultaneously measure dopamine release dynamics across the striatum. Using correlations, we found the signals reflected the initial connectivity patterns. We also investigated the signaling patterns of dopamine release across the striatum during consumption. Previous findings indicate that the VS and DS show activity that is positively correlated with reward, However, it is unknown if the dopamine signaling across the striatum is correlated with consumption. We used fiber photometry in head fixed mice and measured the consumption of various concentrations of NaCl. The results show a correlation between consumption and dopamine release in the VS and the DS Together our results show how signaling across the striatum is during consumption.

Miles Carter

Research Experience Institution: Vanderbilt University

Research Mentors: Wellington Pham

Project Title: Validation of Camelid Nano-Bodies for imagining Alzheimer's Disease

Project Abstract: In an aging population, Alzheimer's disease (AD) will present one of the greatest challenges to medicine in this century. The mechanisms underlying neuronal degeneration in AD remain elusive; however, one of the cytopathologic hallmarks of AD appears to be the formation of amyloid beta (Abeta) plaques between neurons. A promising method to detect these Abeta aggregates with the use of biologics, specifically through the use of antibodies and nanobodies. The Pham lab has focused on the development of nanobodies to target soluble Abeta oligomers in-vivo. This project had two goals, to validate specificity of an anti-soluble Beta-Amyloid oligomer nanobodies and Imaging soluble Beta-Amyloid oligomer flow dynamics in the retina. The project first involved performing a Western blot comparing our regular E3 nanobody to the labeled E3 nanobody probe, to ensure our labeling chemistry was successful. Prior to the retinal injection, an intravenous injection of our E3 nanobody was performed on the lateral tail vein of a 5XFAD mouse. Immediately following the injection, we performed retinal imaging with a Scanning Laser Ophthalmoscopy device which allowed us to observe our probe through the lens of the eye in the vasculature. We were successful in our retinal imaging and could observe our nanobody in the vasculature and capillaries of the retina. We hope to apply this protocol to observe differences in the beta amyloid oligomer flow dynamics between wildtype and 5XFAD mice and produce a more effective method to detect these oligomers/plaques in the retina.

Gaby Castro

Research Experience Institution: University of Maryland, College Park

Research Mentors: Alexander Shackman

Project Title: Understanding the impact of acute alcohol administration on fear and anxiety circuitry: Study overview and preliminary behavioral results

Project Abstract: Alcohol misuse imposes a staggering burden on public health. Existing treatments are far from curative for many. Although the roots of alcohol misuse are complex, anxiety plays a key role. Alcohol is anxiolytic and many drinkers misuse alcohol to dampen anxiety. Psychophysiological research suggests that anxiety-fueled alcohol misuse reflects elevated neural reactivity to Threat, especially Uncertain Threat, yet the neural systems governing anxiolysis in humans remain enigmatic because of the field's reliance on paradigms that do not elicit robust distress. The long-term aim of this project is to use fMRI to understand the impact of acute ethanol administration (Blood Alcohol Level, BAL: Range=0.00-0.15, Median=0.08) on the brain circuits engaged by uncertain and certain threat anticipation—prototypical anxiety and fear triggers—in healthy drinkers (n=67). Preliminary behavioral results confirmed that the Maryland Threat Countdown paradigm evoked significant distress, particularly when threat was uncertain (p=0.03-0.001). Higher BAL was associated with enhanced dampening of threat-evoked distress (p=0.02), with statistically indistinguishable anxiolysis evident for uncertain/certain threat anticipation (r=-0.39/-0.28). These preliminary behavioral observations set the stage for addressing our long-term aim of understanding the acute impact of ethanol on human fear and anxiety circuitry.

Tonya Chaney

Research Experience Institution: Louisiana State University Health and Science Center

Research Mentors: Dr. Jorgelina Calandria

Project Title: Maresin1 induces acquired deactivation of astrocytes in vitro

Project Abstract: Parkinson's disease (PD) is a neurodegenerative disorder that affects the dopaminergic neurons in the substantia nigra (SN). Astrocytes, the largest and most abundant type of supporting cells in the central nervous system, participate in the detection and communication of stress signals from neurons to microglial cells. For this purpose, astrocytes change their phenotype, in some cases transforming themselves into reactive types with the subsequent release of cytokines and chemokines with the activation of Nuclear factor kappa B (NF-kB) transcription factor. These phenotypes direct the defensive neuroprotective efforts to modulate neuroinflammation. We hypothesize that Maresin1 (Mar1) induces the anti-inflammatory conversion of astrocytes that in turn send signals to neurons and microglia to exert toxicity or survival on dopaminergic neurons. This hypothesis was tested in vitro using a primary culture of rat embryonic astrocytes passage 3 and cytokines: tumor

necrosis factor alpha (TNFα) and interferon (INF) type I or alpha-synuclein (α-syn) preformed fibrils (PFF) in the presence or absence of Mar1. Mar1 decreased the nuclear translocation of p65, a pro-inflammatory member of NF-kB. These preliminary results showed that Mar1 may induce the acquired deactivation of astrocytes, previously called A2 state that promotes the survival of neurons. Mar1 also increased the activation of beta-catenin (β-cat) by inducing its translocation into the nucleus. We concluded that astrocytic activation and acquired deactivation via Mar1 took place. Markers of anti-inflammatory astrocyte phenotypes are needed to determine whether p65 is part of the pro-survival astrocytic program. These pathways open novel avenues for the treatment of PD.

Vivian Chen

Research Experience Institution: University of Washington

Research Mentors: Victor Y. Zhang, Asad Beck

Project Title: Investigating Whether Amygdalar Optogenetic Stimulation Induces Changes in Behavior and c-Fos Expression

Project Abstract: Synchronization (or entrainment) of circadian rhythms by external environmental cycles (zeitbegers) aid organisms in anticipating environmental changes. While the 24-hour light-dark cycle is the main zeitgeber, non-light cues can also entrain circadian rhythms. Research in the de la Iglesia lab shows that nocturnal fear in the form of foot-shocks administered while mice are foraging and feeding in a foraging area can act as a potent zeitgeber and entrain circadian rhythms, prompting a switch from nocturnal to diurnal behavior. To delve deeper into the circuitry underlying fear entrainment, the laboratory is currently using unilateral optogenetic stimulation of the basolateral amygdala (BLA) to determine if the activation of fear centers can elicit entrainment of circadian rhythms. The use of optogenetic stimulation enables the activation of specific neuronal populations expressing light sensitive channels through light delivered via implantable probes. During optogenetic stimulation that emulates the timing of the nocturnal fear, a small subset of mice displayed freezing responses but did not flee the foraging area as they do in response to foot-shocks. To assess the accuracy of expression of light sensitive channels and the ability of light to stimulate neurons regionally, animals received a final exposure to optogenetic stimulation after which they were euthanized and their brains were processed for immunohistochemistry against cFos, a marker of neuronal activation, and subsequently imaged using confocal microscopy. A comparison was conducted between the cFos expression in the contralateral BLA sections that received optogenetic stimulation and those that did not. Evaluating both the behavioral fear responses during the stimulation period and the presence of positive indicators of neural activity (c-Fos and m-Cherry) in the stimulated brain regions is imperative to verify the effectiveness of the optogenetic stimulation approach. In the future, we intend to build upon these findings with the aim of identifying the neural networks responsible for fear entrainment, giving valuable insight into the neuronal mechanisms underlying fear-related sleep disturbances in individuals with post-traumatic stress disorder.

Valeria Clemente

Research Experience Institution: Michigan State University

Research Mentors: Samantha Caico

Project Title: Investigating the relationship between SGK1 phosphorylation and catalytical activity in Neuro 2A cells

Project Abstract: Despite the high health and economic costs from drug use, treatment options are inadequate. Lack of treatment options is driven by our incomplete understanding of the neurobiology underlying this disease. The ventral tegmental area (VTA) has a critical role in the rewarding aspects of drugs of abuse. Previous work in our laboratory has found that chronic cocaine and morphine administration increases both the activity and phosphorylation of serum and glucocorticoid inducible kinase 1 (SGK1) in the VTA and that reducing VTA SGK1 activity and phosphorylation decreases drug behavior in mice. These data implicate SGK1 as a novel target for treatment of drug addiction. Therefore, we hypothesize that pharmacological inhibition of SGK1 is sufficient to reduce drug responses. We will be using a commercially available SGK1 inhibitor, GSK650349, to first assess the ability of GSK650349 to inhibit SGK1 activity in a Neuro2A cell model. We will assess whether GSK650349 can

decrease the phosphorylation of an exclusive SGK1 substrate, NDRG, and decrease phosphorylation of SGK1 at its N-terminus site, via Western blot. We will also perform transfection experiments with mutant SGK1 constructs to determine the relationship between SGK1 phosphorylation and catalytic activity. Finally, we will determine if GSK650349 inhibits SGK1 activity *in vivo* and is capable of altering drug behavior. These experiments will increase our understanding of the role of SGK1 activity and phosphorylation in drug responses and investigate therapeutic potential of SGK1 inhibition in treatment of substance use disorders.

Shylyn Collier

Research Experience Institution: Washington University School of Medicine in St. Louis

Research Mentors: Dr. Jason Yi, Kellan Weston

Project Title: Characterization of Microcephaly in a Mouse Model of UBE3A Hyperactivation

Project Abstract: UBE3A is an E3 ubiquitin ligase responsible for tagging proteins for degradation by the ubiquitin-proteasome system. In neurodevelopment, maternal deletion, or nullification of UBE3A in neurons can cause an intellectual disability known as Angelman syndrome. Conversely, duplication of maternal UBE3A has been linked to a syndromic form of autism known as Dup15q syndrome. From previous work, we discovered that gain of function mutations on the maternal allele of UBE3A can cause neurodevelopmental pathology; however, there is a substantial gap in understanding how hyperactive UBE3A impacts normal brain development. Here, we investigate a hyperactive UBE3A variant, Q588E, and its impact on brain development in a mouse model. By analyzing *in vivo* whole-brain volumetric MRI data, measuring cortical neuron density, and recording brain weights, we conclude that there is a microcephaly phenotype in the mQ588E mouse model.

Gian Correa

Research Experience Institution: Michigan State University

Research Mentors: Dr. Scott E. Counts

Project Title: Locus coeruleus regulation of forebrain microglial activation in Alzheimer's disease

Project Abstract: Neurodegeneration of noradrenergic locus coeruleus (LC) neurons that regulate attention, memory, and executive function is an early feature of Alzheimer's disease (AD). Notably, LC neurons innervate immune cells in the forebrain including microglia. In AD, microglia are activated to engage in the clearance of amyloid-β pathology. However, when microglia are overactivated, they induce neuroinflammation which can exacerbate existing pathology. Since LC noradrenergic signaling in microglia is postulated to promote homeostasis in order to prevent this pro-inflammatory response, we aim to determine if LC degeneration and subsequent loss of norepinephrine signaling increase microglial activation and inflammation in AD. To address this, we will perform immunohistochemistry using an antibody to the activated microglia marker MHC-II in order to identify and quantify the amount of microglia-related inflammation in forebrain tissue of transgenic Tg344-19 AD rats with or without an LC-specific immunotoxin lesion (n = 4/group), as well as control nontransgenic rats (n = 2). We anticipate quantifying an increased load of activated MCH-II-positive microglia in LC-lesioned compared to non-lesioned animals. If successful, this project will provide evidence from a translational AD rat model that LC degeneration promotes microglial dysfunction and inflammation during disease progression.

Andrea Corretjer Diaz

Research Experience Institution: Johns Hopkins University

Research Mentors: Ceyda Sayali, Frederick Barrett

Project Title: Psilocybin's Potential as Treatment for Opioid Use Disorder

Project Abstract: Opioid use disorder (OUD) is a multifactorial chronic condition that has claimed the

lives of over 500,000 people from 1999-2020. OUD is often accompanied by comorbid mental illnesses like depression, bipolar disorder, and schizophrenia. This complex disorder is exacerbated by stigma, psychological

trauma, limited economic opportunities, and social disconnect. These pose various challenges in the development of effective treatments. While current treatments such as methadone, buprenorphine, and naloxone have demonstrated efficacy in reducing overdose death, they present limitations such as patient retention, cost, and side effects. Emerging treatments such as suvorexant show potential for improved treatment options. Results from numerous studies suggest that psychedelics are very effective at treating disorders such as anxiety, depression, and substance abuse disorder. This narrative review focuses on psilocybin, a classical psychedelic, and its potential as treatment for OUD. Correlational data suggests a decreased likelihood of developing OUD when individuals have a history of psilocybin use throughout their lifetime. Opioids and psilocybin have distinct mechanisms of action on the brain. Opioids bind to mu, kappa, and delta receptors, which are located in some of the same brain regions where psilocybin binds to serotonin receptors. This overlap sparked speculation about a potential connection between the serotonergic and dopaminergic systems. Research suggests that both systems have an important role in the development of opioid use disorder (OUD). Additional research is needed to confirm the interaction between these two systems and their implications for OUD.

Christian Cortes

Research Experience Institution: University of California, San Diego

Research Mentors: Dr. Victoria Risbrough, Dr. Christopher Hunt, Giovanni Castillo

Project Title: Post-deployment PTSD Symptoms Predict the Development of Attentional Deficits 10 Years Later

Project Abstract: Individuals with post-traumatic stress disorder (PTSD) often present with neurocognitive deficits, but little is known about how these issues interact with each other across time. Although certain neurocognitive deficits, particularly in executive function, have been associated with increased risk for PTSD, chronic PTSD symptoms may also lead to subsequent declines in neurocognition, but this possibility has yet to be explored. Here, we examined the prospective and longitudinal relationship between attentional abilities, trauma exposure, and PTSD symptoms in active-duty Marines (N = 80) before going on a combat deployment, soon after the deployment, and ~10 years after the deployment. We hypothesized that attentional deficits at pre-deployment would increase risk for PTSD immediately after post-deployment, and that higher PTSD immediately after post-deployment would in turn predict worse attention 10 years later. PTSD symptoms were operationalized as total scores on the Clinician Administered PTSD scale for DSM-5 (CAPS-5) while attentional abilities were operationalized as mean reaction time (RT) on the continuous performance task (CPT). Hierarchical regression models were used to determine whether CPT mean RT predicted changes in CAPS scores and whether CAPS scores predicted changes in CPT mean RT. Higher CAPS-5 scores immediately post-deployment significantly predicted longer CPT mean RT at 10-year follow-up ($\beta = 0.41$, $p < .001$), controlling for CAPS-5 scores post-deployment. In contrast, higher CAPS-5 scores at pre-deployment did not predict CPT performance immediately post-deployment and CPT performance at immediate post-deployment were not predictive of CAPS-5 scores at either timepoint (ps > .088). Veterans with heightened PTSD symptoms in the intermediate aftermath of deployment may be at increased risk for declines in neurocognition later in life.

Kensal Coudriet

Research Experience Institution: University of California, Berkeley

Research Mentors: Dr. Emily Cooper, Iona McLean

Project Title: Investigating Gaze Stabilization Responses to Movie Clips

Project Abstract: When we move our bodies or when objects around us move, this causes visual motion on our retinas. Despite all this visual motion, the world almost always appears stable. Gaze stabilization and visual tracking eye movements counteract visual motion and support our ability to see objects of interest clearly during natural behavior. However, previous studies characterizing gaze stabilization responses often used simple visual patterns like moving lines or dots. These stimuli do not fully capture the types of visual motion encountered during natural behavior, which pose unique challenges due to variability and noise. Movies represent a stimulus of intermediate visual complexity between typical stimuli and fully natural experience. Therefore, to investigate semi-

naturalistic eye movements we utilized a publicly available data set of eye movements recorded while participants viewed clips from popular movies (Costela and Woods, 2019). We quantified gaze stabilization and short-latency visual tracking by calculating the eye movement gain within the ~40ms of each frame in the movie clip. Gain was defined as the ratio between eye movement and optic flow velocities at fixation. Eye movement velocity was calculated from position traces with saccades removed, and optic flow velocity at fixation was calculated using the Farneback method. To validate that movie clips can be useful for investigating gaze stabilization, we attempted to replicate findings from controlled experiments. Consistent with prior work characterizing eye movement gain, we found that the average gain tended to be positive and less than 1. Based on prior work we also expected that upward motion would tend to produce a higher gain than downward motion, however, this pattern was only true for some of the movie clips and not others. This shortcoming could result from the fact that the prevalence and salience of upward and downward optic flow varied between the clips. In future work, we aim to quantify the frequency and strength of each flow direction in the movie clips and select only clips where their prevalence is similar. Overall, these results suggest that gaze stabilization responses may be studied with complex stimuli that hold potential to reveal how these responses function during natural behavior.

Angélica Sofía Cruz Calderón

Research Experience Institution: University of Puerto Rico, Río Piedras Campus

Research Mentors: Dr. Cornelis Vlaar Stoop

Project Title: Design and Synthesis of Novel Nav Channels Inhibitor for Epilepsy

Project Abstract: Background: Epilepsy is a disorder that affects the central nervous system and manifests as repeated seizures. Research has shown that there are numerous factors that induce this disorder including: trauma, infection, stroke, tumors, and genetic mutations in one or more ion channels. Voltage-gated sodium channels (VGSC) play a central role in the generation and propagation of action potentials. Limitations in current drug treatments due to long-term adverse effects and drug-resistant epilepsy highlight the necessity for novel therapies. Channelopathies resulting from mutations in VGSC, especially the α subunit of Nav 1.1, have been identified in patients with epilepsy Rufinamide is an antiepileptic drug that has been FDA-approved in 2008 as an adjunctive treatment for seizures associated with Lennox-Gastaut syndrome. It is suggested to act by modulation of the sodium channels. Objective: The aim of this study is to design and synthesize novel derivatives of Rufinamide with improved anti-epileptic activities via selective Nav 1.1 channel inhibition. Methods: Site-specific docking with the molecular modeling software AutoDock Vina predicted the binding affinity and interaction of rufinamide to the VGSC Nav 1.1. Subsequent docking of a series of compounds in which its difluorophenyl group was isosterically replaced with other aromatic heterocycles was performed to predict novel derivatives with possibly increased potency. These derivatives were selected for synthesis. Results: Rufinamide was calculated to bind to Nav 1.1 with a binding energy of -6.5 kcal/mol. From the calculated derivatives that were designed, introduction of an indole or benzothiazole group appeared especially beneficial, increasing calculated binding affinity to -7.3 kcal/mol. Several azido-indoles were synthesized as the starting materials and via click chemistry will yield the core triazole ring that is also present in rufinamide. Conclusion: The use of molecular modeling software in this project allows us to predict the activity of the proposed molecules and develop new compounds. Further research is needed to test the anticonvulsant activity of the novel compounds and evaluate their selectivity towards inhibition of VGSC Nav 1.1.

Tamara Dandreamatteo

Research Experience Institution: Washington University in St. Louis

Research Mentors: Jonathan Kipnis and Jose Mazzitelli Perez

Project Title: Investigating the Mechanisms Underlying Impaired CSF Perfusion in Rett Syndrome

Project Abstract: Rett syndrome is an X-linked neurodevelopmental disorder that affects patients within the first years of life and is characterized by a regression in motor and cognitive abilities. Given the neurological symptoms, scientists have historically focused on neuronal mechanisms of disease. However, little is known

about non-neuronal mechanisms that may be contributing to disease. Once such mechanism may be the proper circulation of cerebrospinal fluid (CSF) throughout the central nervous system (CNS). CSF is crucial to brain stability-responsible for clearing waste and maintain fluid homeostasis in the CNS. Preliminary data suggests that CSF dynamics are broadly impaired in Rett syndrome but the mechanisms underlying this phenotype are unknown. We investigated three major regulatory mechanisms of CSF perfusion: aquaporin-4 (AQP4), parenchymal border macrophages (PBM), and meningeal lymphatics. Using a widely validated MeCP2-deficient mouse model of Rett syndrome, we found that levels of AQP4 expression and abundance of PBMs throughout the brain were unchanged in Rett mice compared to their wildtype littermates. Immunohistochemical evaluation of the dural meninges in pre-symptomatic Rett mice, however, revealed a reduction in meningeal lymphatic coverage. This uncovers a novel potential contributor to Rett pathogenesis and suggests that rescuing meningeal lymphatics might be a promising therapeutic target for the treatment of Rett syndrome.

Omaris Y De Pablo Crespo

Research Experience Institution: Institute of Neurobiology, University of Puerto Rico Medical Sciences Campus

Research Mentors: Dr. Andrew Seeds

Project Title: Characterization of neuronal patterns in a transgenic driver line in *Drosophila melanogaster*

Project Abstract: Complex motor behaviors are produced through the sequential selection of different movements, but how the brain is organized at the level of neural circuits to drive behavioral sequences remains unclear. We study grooming in fruit flies, a complex motor behavior in which the legs are used to clean different body parts such as the antennae, eyes, and wings. Given that grooming consists of a stereotyped sequence, it serves as a behavioral model for understanding how neural circuits drive sequential movement selection and determine the neuronal mechanisms by which specific movements are initiated and controlled. To understand the neural mechanisms that drive grooming sequences, we were looking to define how the individual grooming movements are elicited by neural circuits. Previous work found that each movement is elicited by its own dedicated circuit that consists of sensory, inter-, and descending neurons (Hampel et al., 2015). Preliminary data showed that interneurons include a lineage of morphologically distinct neurons that have been named brain neurons 2 (BN2). This led to propose that each BN2 neuron elicits site-directed grooming movement in response to input from mechanosensory neurons from a specific body part to which they are connected. Here, we tested the extent to which the morphologically distinct BN2s elicit specific movements. We characterized neuronal patterns by using the GAL4 / UAS binary expression system. We worked with one driver line that targets the BN2 neurons to observe both the neuronal pattern and individual neurons of these BN2 neurons through brain imaging. We characterized individual neurons in the identified pattern to assess their morphology and function in grooming behavior. The multicolor flip-out technique was used to label individual neurons by performing immunohistochemistry on the dissected fly brains. We observed the neuronal pattern of this transgenic driver line, and specifically, we identified two individual neurons of this pattern. By defining the neural mechanisms that drive sequential movement selection, we will understand the basic principles of neural circuits and their organization to produce complex behaviors.

Alejandro Dueno Sosa

Research Experience Institution: University of Michigan

Research Mentors: Dr. Anuska Andjelkovic Zochowska

Project Title: The role of Sirtuin-1 in epigenetic modulation of the Blood Brain Barrier in aging

Project Abstract: The blood-brain barrier (BBB) regulates and ensures safe substance exchange between the central nervous system and the blood, becoming more permeable with aging. Leakage of the BBB is caused by intensive remodeling of barrier composition, mirrored in lower expression of certain junction proteins. A consequence of decline in BBB function is emergence of cerebrovascular disorders and enhancement of the neurodegenerative processes. The RNA sequencing analysis we performed on isolated microvessels from young (6 months old) and aged (18 months old) mice revealed specific transcriptive profiles of young and

aged microvasculature. One of the significant changes in gene expression was of sirtuin-1 (Sirt1). Sirt1 is a nicotinamide adenosine dinucleotide (NAD)-dependent deacetylase involved in a broad range of physiological functions including control of gene expression, metabolism, and aging. At the BBB, Sirt1 has protective effects in aging, and its overexpression has been shown to reduce BBB leakage, although through unknown mechanisms. This study is aiming to evaluate how overexpressing Sirt1 affects the expression of various epigenetic factors in the "aging" BBB. To test this, we performed a gene array analysis of the various epigenetic factors, such as histone acetylases and DNA methylases, on isolated microvessels from an aged Sirt1 overexpressing transgenic mouse (SirtTg) and an aged control mouse. We found significant upregulation of histone acetylase 1, histone deacetylases 2, 5, 6, and 7, and DNA methylase 1 in the SirtTg mouse. This suggests that Sirt1 interactions impact DNA methylation and histone acetylation through downstream effects that may be contributing to regulation of junctional protein expression and decreased BBB leakage in aging. Understanding the vasoprotective functions of Sirt1 may help in finding treatment to prevent cognitive decline in natural aging, as well as the emergence and progression of neurodegenerative and cerebrovascular disease.

Pansée ElGhayati

Research Experience Institution: Scripps Research

Research Mentors: Sourish Mukhopadhyay, Lisa Stowers

Project Title: Sex Parity in Pheromonal Communication

Project Abstract: Social communication among animals often involves chemical signaling, notably through scent marking. While extensively studied in male mice, the prevalence and dynamics of scent marking in response to social odor cues in females remain unclear. In this study, we aimed to determine if female mice engage in scent marking behavior in response to female odor cues and to unravel the factors influencing this behavior. Contrary to prevailing beliefs, we discovered that female mice engage in scent marking if exposed to novel social odors cues as adolescents, highlighting the role of early-life experiences in shaping this behavior. In this paradigm, males and females showed similar rates of scent marking (n = 19F, 20M, ~65% markers each sex). This scent marking ability is a persistent change in their behavior that is displayed through adulthood. Although males deposit slightly more spots than females do, comparing multiple parameters underlying male and female marking patterns, both sexes exhibited a comparable rapid response to social odor, indicating a sexually monomorphic mechanism of sensory perception, subsequent arousal and motor response. Intriguingly, sex hormone analysis (estrogen & testosterone) revealed no significant differences between female mice that show scent marking behavior and those that do not, underscoring that the adolescent social odor exposure does not induce hormonal shifts that may account for the observed variations in marking behavior. We also found no indication of physiological masculinization, indicating this is a social behavior that females can perform naturally. We further performed a classical urine marking assay with two live animals separated by a porous barrier, preventing interaction but allowing olfactory detection. Our results allow us to test animals before and after prolonged social exposure, enabling us to test if social experience modulates the pattern of female scent marking, and scope for adaptability and flexibility of scent marking as a general form of social communication. Understanding the intricacies of scent marking in both male and female mice enhances our comprehension of inter- and intra-sexual communication and the broader ecological and evolutionary implications of this social behavior.

Immanuela-Nicole Enwesi

Research Experience Institution: University of Maryland, College Park

Research Mentors: Tracy Riggins

Project Title: Assessing relations between thalamic volume and sleep duration in preschool-aged children

Project Abstract: Sleep plays a crucial role in human development, impacting cognition, behavior, and the brain. However, the distribution and duration of sleep varies with age, as infants may take 3-4 naps a day, toddlers typically take 2 naps a day and preschoolers take one nap, with the age range of 3-5 years being when they transition from biphasic to monophasic sleep. The thalamus is a pivotal component of the limbic system

associated with sleep and wakefulness (and also plays a role in memory processing as well as motor and sensory processing). When considering how sleep affects the brain and conversely how the brain affects sleep, research in animals and adults suggest that the most active part of the brain during sleep is the thalamus. Despite its pivotal role, assessment of the thalamus during development when sleep is dramatically changing remains an unexplored area of research. This study will investigate relations between sleep duration and thalamus volume in children aged 3-5 years (n=32). Building on prior research by Riggins and Spencer, which linked habitual sleep patterns (i.e., a habitual afternoon nap) to hippocampal volume, this study explores whether sleep duration is associated with thalamic size. It is hypothesized that children who have shorter sleep durations (yet still fall within the recommended 10-13 hours per day range for this age group) will exhibit variations in volume of this limbic structures. Utilizing data from a previous study involving parent report, actigraphy and Magnetic Resonance Imaging data (MRI), sleep duration will be quantified through parent surveys and actigraphy. Thalamic volume will be derived from T1-weighted structural MRI scans using FreeSurfer. The study's analyses aims to unveil correlations between sleep duration and thalamic volume, while accounting for age-related variables and potential confounding factors. Results from this investigation will advance current knowledge on how sleep and thalamus are related. The findings are expected to deepen the understanding of the intricate interplay between sleep, brain structure, and early childhood development, shedding light on this critical aspect of human growth.

Joyce Escatel-Flores

Research Experience Institution: CUNY Brooklyn College

Research Mentors: Dr. Liat Kofler, Dr. Yu Gao

Project Title: The impact of early environmental adversity on autonomic nervous system: a longitudinal study

Project Abstract: Respiratory sinus arrhythmia (RSA) is a heart rate variability measure indexing parasympathetic nervous system-linked cardiac activity and has been linked to emotion regulation and multiple psychopathologies. Environmental adversity (EA) is defined as risk factors such as neighborhood crime, parental marital conflict, low social economic status, stress, and abuse that occur in a person's lifetime. Researchers have found that EA has a significant impact on RSA changes in children and adolescents. Evidence has suggested that in children, girls who experience more EA have a lower resting RSA and are more likely to show poor emotional regulation (Feurer et al., 2019). In contrast, one study found that positive parenting style was associated with lower RSA in low-marital-stress settings and higher RSA in high-marital-stress settings (Lisitsa, 2021). In this study, we aimed to examine the effects of different EA factors on RSA and hypothesized that overall, higher EA would be associated with lower RSA and that parental marital conflict would be the strongest impact factor. Data from a longitudinal community study were used to test these hypotheses. Participants consisted of 8–11-year-old boys and girls and their caregivers who visited the laboratory for a battery of tests. Resting RSA was measured while children were relaxing for 2 minutes, and EA was assessed via parents' reports on social adversity, prenatal maternal stress, neighborhood collectiveness, child abuse, domestic violence, and parenting styles. Results failed to support the proposition that exposure to higher amounts of EA is associated with a lower resting RSA.

Makenna Fluegel

Research Experience Institution: Washington University, School of Medicine

Research Mentors: Dr. Jiwon Yi, Dr. Robert Gereau

Project Title: Characterizing expression patterns of endocannabinoid receptor type 1 (CB1R) among different mouse sensory neuron subpopulations

Project Abstract: In the search for alternatives to current chronic pain treatments, peripherally restricted cannabinoids have shown promise in promoting analgesia while avoiding some of the negative side effects of opioids. Present understanding of peripheral cannabinoid type 1 receptors (CB1R) and their expression patterns is limited to studies in rat and results vary widely by technique. In this study, we aim to characterize the expression patterns of CB1 in mouse dorsal root ganglion (mDRG) sensory neuron subpopulations using

RNAScope, which is a reliable method for studying receptor expression. Using RNAscope in situ hybridization, we found that within the total population of DRG neurons, approximately 65% showed positive expression for CB1 receptors. When CB1 receptor expression was assessed in different subpopulations of sensory neurons, we found that CB1R expression was highly enriched in the PVALB-expressing proprioceptor population (76%). Analyzing colocalization of CB1 with the nociceptor marker, SCN10A, revealed that 55% of nociceptors express CB1 receptors. Approximately 54% of TRPV1-positive peptidergic neurons colocalized with CB1 receptors. Fluorescence expression of the channel containing CB1R was highest within the PVALB-positive population, suggesting that proprioceptors also express more CB1 receptors per cell, although the effect size was small. No sex differences in CB1 expression patterns were found within the general CB1 positive, SCN10A and CB1 double-positive, TRPV1 and CB1 double-positive, or PVALB and CB1 double-positive populations. We conclude that CB1 receptors expressed on nociceptive sensory neuron subpopulations may contribute to pain modulation in mice.

Drake Gorecki

Research Experience Institution: Washington University in St. Louis

Research Mentors: Lizzie Tilden, Yao Chen

Project Title: Development of a Closed-Loop System for Sleep/Wake Detection in Mice

Project Abstract: Certain intracellular signals may affect an organism differently depending on whether they are asleep or awake. To explore these signals' roles in different sleep/wake stages, our lab is developing a closed-loop system capable of determining a mouse's sleep/wake state and modulating an output accordingly. This system will receive live EEG/EMG signals as input and use spectral powers for sleep/wake classification. During the summer I was responsible for assessing whether the commercial software Sirenia Feedback Pro could accurately classify mice as being asleep or awake in real-time using spectral power thresholds. Our evaluation criteria included the overall epoch-based accuracy, the sensitivity of Sirenia to sleep-to-wake transitions, and the precision with which Sirenia identified sleep-to-wake transitions. To both determine the optimal power band thresholds for automatic scoring and evaluate Sirenia's scoring, I manually sleep-scored 24 hours of EEG/EMG data from a single mouse and compared it to automatic scoring using various sets of thresholds. I found that Sirenia had trouble identifying transitions due to the fact that it did not incorporate raw EMG data, historical trends, and motion data in its scoring. Because of this, I wrote my own python script that could automatically sleep-score using these features, which led to increases in accuracy, sensitivity, and precision. We conclude that future closed-loop systems should consider integrating these features into their design. The development of an adequate closed-loop system holds promise for more accurate and effective investigations into the functions of signals associated with certain sleep/wake stages.

Andrea Guerra Chong

Research Experience Institution: University of California, San Diego

Research Mentors: Dr. Paula Desplats, Dr. Daniel Whittaker

Project Title: Cellular Effects of Forced Circadian Desynchrony on the Aging Brain

Project Abstract: Alzheimer's disease (AD) affects over 6.3 million Americans, becoming the most prominent health challenge in the United States, devastating the lives of the aging population and their families—as age is one of the main risk factors for the neurodegenerative disease. The characterization of AD includes the accumulation of β-amyloid plaques and phosphorylated Tau proteins in the brain. In addition, circadian rhythm disturbances are reported in AD patients, exacerbating cognitive and behavioral symptoms that accompany the disease. Therefore, addressing circadian rhythm dysfunctions and corresponding treatments is crucial for further understanding aging and Alzheimer's disease. Our research aims to comprehend the correlation among these factors by analyzing the effects of forced circadian desynchronization (FCD) on biomarkers associated with cellular aging. The study will use APP23 mice as an animal model, comparing three different conditions: young LD mice (13 mo), young FCD mice (13 mo), and old LD mice (19 mo). To assess AD neuropathology, immunohistochemistry and immunofluorescence will be performed using biomarkers, namely GFAP and Iba1,

to help gain insight into the impact of FCD and determine if it is representative of AD progression. In addition, cellular senescence markers will also be analyzed, such as the quantity and characteristics of β-galactosidase and inhibitors p16 and p21 in the tissue—the up-regulation of these factors are considered a hallmark of an aging brain. Further molecular assessments, transcriptomic analyses, behavioral and activity evaluations will be conducted to supplement the understanding of the impact of circadian rhythm disruptions on the aging brain and Alzheimer's disease.

Hector Haddock

Research Experience Institution: University of Puerto Rico Medical Science Campus

Research Mentors: Dr. Demetrio Sierra-Mercado

Project Title: Effects of Glyphosate on Exploration of a Novel Context

Project Abstract: Epidemiological studies have shown a correlation between the increased diagnosis of anxiety and the use of herbicides, such as glyphosate. The Environmental Protection Agency (E.P.A.) has established a chronic reference dose of 2.0mg/kg for glyphosate to be unlikely to cause harm. Noticeably, preliminary work from our group suggests that glyphosate at this dose increases anxiety-like behaviors in rats. Given that anxiety-levels can alter exploratory behaviors, we aim to evaluate how glyphosate affects exploration of a novel context. Adult male rats were given access to drinking water ad libitum for 16 weeks. The experimental group (n=13) received water containing glyphosate prepared for a target dose of 2.0mg/kg, whereas the control group (n=12) received filtered water. Rats were transferred to a novel animal cage and evaluated for a set of exploratory behaviors, namely distance traveled, time immobile, and number of rearings. Glyphosate decreased both distance traveled measured in meters (glyphosate,: 9.24, control: 16.57; p=0.0305) and total number of rearing counts (glyphosate: 13.10, control: 22.10; p=0.0119), whereas glyphosate increased time immobile measured in seconds (glyphosate: 429.3, control: 329.1; p=0.0364) in a novel animal cage. Glyphosate decreased distance traveled as well as number of rearings, both indicative of decreased exploration. Furthermore, glyphosate increased the amount of time that animals spent immobile. All together, these results indicate that glyphosate decreased exploratory behaviors, likely secondary to an increase in levels of anxiety. Future directions include evaluating brain regions implicated in anxiety and exploration for neuronal activity.

Kassandra Hamilton

Research Experience Institution: Washington University in St. Louis

Research Mentors: Dr. Janine Bijsterbosch

Project Title: Investigating neural correlates of state depression using large datasets

Project Abstract: Depression is characterized by structural and functional differences in brain regions responsible for the processing of emotion and executive functioning, such as grey and white matter alterations in the amygdala and disruption in corticolimbic functional connectivity. Despite focus on specific brain regions, other work has suggested highly multivariate whole brain correlates of depression. We hypothesize that frontoparietal, visual, somatomotor, limbic, and default mode networks contain significant neural correlates of state depression. Using T1 structural MRI data and the Recent Depression Symptoms-4 (RDS4) score, which measures level of experienced depression symptomology on scan day, from the UK Biobank, we examined the relationship between structural differences within the seven Yeo networks and state depression score. Our results showed structural neural correlates predominantly within visual, somatomotor, ventral attention, and default mode networks. These results will guide future big data research into the neural correlates of state depression.

Maya Hawkins

Research Experience Institution: University of Michigan

Research Mentors: Anuska Andjelkovic, Muyu Situ

Project Title: Altered YAP1 Expression and Activity in Brain Capillaries in Cerebral Amyloid Angiopathy

Project Abstract: Cerebral amyloid angiopathy (CAA) is a cerebrovascular disease characterized by amyloid-beta (Aβ) accumulation around brain capillaries and arterioles. This Aβ buildup is associated with blood-brain barrier (BBB) injury, inflammation, occurrence of microbleeds, and hemorrhagic stroke. The cause of BBB/microvascular injury is still unknown. Our recent RNA sequencing analysis profiled brain microvessels in a CAA murine model (Tg-SwDI mice) and indicated an upregulation of genes associated with inflammation and aberrant vascular function. Among the significantly upregulated genes was Yes-associated protein 1 (YAP1), a component of the hippo-signaling pathway that acts as a transcriptional coregulator of genes associated with apoptosis and cellular homeostasis. This study aimed to verify expression and activity of YAP1 in blood vessels from Tg-SwDI mice and determine whether YAP1 activation correlates with BBB injury in CAA. The analysis was done in isolated microvessels from young (6 months) with low to no-amyloid accumulation and old (18 months) Tg-SwDI mice with profound amyloid accumulation using Western blots and RT-qPCR. Our results confirmed that Aβ buildup results in increased expression of YAP1 mRNA and protein. Furthermore, as phosphorylation indicates the functional status of the YAP1, we assessed the presence and localization of phosphorylated Ser127-YAP1 in blood vessels from Tg-SwDI mice and amyloid-exposed brain endothelial cells. Our data indicated decreased phosphorylated Ser127-YAP1 and higher accumulation of nonphosphorylated YAP in cell nuclei, implying YAP1 activation and a potential role in the modulation of BBB injury in CAA. These results indicated that YAP1 could be a potential marker of BBB injury in CAA.

Alek Helgesen-Thompson

Research Experience Institution: University of Washington

Research Mentors: Asad Beck, Glorianna Gutierrez, Horacio de La Iglesia

Project Title: Machine Learning-Based Prediction of Seizure Stage in a Mouse Model of Epilepsy

Project Abstract: Dravet syndrome is a rare childhood-onset form of epilepsy caused by a mutation in the SCN1A gene. It is characterized by early life seizures and resistance to common treatments of epilepsy, leading to greater frequency of uncontrolled seizures and heightened likelihood of death. The goal of this project was to develop methods of forecasting seizure onset in real-time to better develop methods to prevent seizures from occurring. Using a mouse model of Dravet Syndrome (heterozygous knockout of SCN1a gene), we implanted mice with two electrocorticography (ECoG) and one electromyography (EMG) electrodes and chronically recorded neural data to capture spontaneous seizures. Days containing spontaneous seizures were then analyzed post-hoc, dividing the data into stages of interictal, pre-ictal (using five, ten, and twenty minutes prior to seizure onset), ictal, and post-ictal, with additional data from wild-type (WT) mice included as control. A total of 98 time- and frequency-based features were extracted and used to train and compare ten algorithms for predicting seizure stage in 5-second epochs. I found that linear discriminant analysis (using singular value decomposition solver) had the best prediction time (approximately .001 seconds) and test accuracy (64.5%). This algorithm displayed high recall for ictal (72%) and pos-t ictal, (86%) stages, with most errors occurring between interictal, pre- ictal, and WT stage recall. Finally, when applied to two seizures, it generally captured the temporal progression of seizure genesis (interictal ₀preictal ₀ictal ₀post- ictal ₀interictal), suggesting this method may be a promising avenue for real- time seizure stage prediction and, thus, seizure genesis forecasting.

Ryan Henry

Research Experience Institution: Yale University

Research Mentors: Alex Rich, Dr. Ifat Levy

Project Title: Binge Eating and Cognitive Flexibility: A Prospective Study on Food Valuation Deficits in Obesity

Project Abstract: Binge eating signifies a distinct and particularly detrimental phenotype of obesity, with this comorbidity often linked to compromised cognitive flexibility and impaired value-based decision-making. The objective of this study is to characterize the behavioral and biological determinants associated with food valuation deficits in individuals with obesity (OBs). The primary aim of this study is to ascertain whether the severity of binge eating predicts the ability of an obese sample to modulate their inherent values for food items.

To investigate this, we designed a novel task that integrates individual preferences into decision making to assess the inflexibility of value updating in the presence of new reward information. First, participants will be required to rate food images. Participants will then be presented with food-related stimuli which they rated as personally salient in the form of two tasks: a passive learning task and a choice task. In the passive learning task, food stimuli is associated with an outcome and participants will be asked to anticipate the outcome. Subsequently, in the choice task, they will be making selections between stimuli, with points as outcomes awarded based on their choices. In "aligned" trials, participants' subjective value assessments match the displayed outcomes. Conversely, "unaligned" trials switch the assigned outcomes, leading to negative outcomes when stimuli initially rated positively are selected. We hypothesize that OBs will demonstrate compromised inherent value updating for food stimuli, a phenomenon potentially mediated by binge eating severity. Specifically, we predict that OBs will display lower accuracy in 'unaligned' trials and that binge eating severity will significantly mediate the relationship between task performance and body mass index. This study examines deficits in valuation mechanisms, taking into account individual differences, thereby enriching our comprehension of OB-BE as a unique phenotype that necessitates personalized intervention strategies.

Madeline Hernandez

Research Experience Institution: University of Washington

Research Mentors: Jingyi Chen, Michael Bruchas

Project Title: Stress Induced Increases in Calcium and Dynorphin Signaling in the Claustrum

Project Abstract: Experiencing stress has severe effects on human functionality, that in turn, shifts behaviors and neural activity. Stress-Shaped sensory perception not only affects how we maintain our selective attention, but it has long-term health effects affecting all aspects of life. However, we still have very little understanding of how and where stress shapes sensory perception in such a broad way. The Claustrum supports glial cells that connect the cerebral cortex to important signaling regions of the brain, such as the hippocampus, thalamus, and amygdala. This densely packed structure interconnects trillions of neurons in an intricate network that has not yet been explored due to its elongated structures and complex connectivity. However, using the technique of Fiber Photometry, an in vivo recording method to detect neural activities through fiber implants, we were able to see GCaMP6f (ultrasensitive fluorescent protein) in mice used to detect fluctuating signals of Calcium. Our results conclude that there is an increase in the signal of GCaMP6f responding to both tail lift and female urine under stress conditions compared to non-stressed condition, suggesting stress modulate Claustrum activities across multiple sensory domains. Along with detecting Calcium2+, we also tested Dynorphin signaling, a key neuropeptide is closely involved in pain, addiction, and mood regulation and is an important factor related to stress modulation. We use a novel genetically encoded sensor Klight to record dynorphin releases in the Claustrum. Utilizing KOR-Cre mice, a Cre-Lox recombinase tool, we were able to specifically record dynorphin signaling in the claustrum-Kor+ population during tail lift and female urine stimulation. We observed an increased Klight signal during stress condition towards both tail lift and female urine, suggesting that dynorphin signal directly modulate stress responses towards multiple sensory stimulation in the Claustrum, bridging the gap in our understanding of the Claustrum and dynorphin, and how this signaling affects stress and sensory modulation.

Yana Honcharuk

Research Experience Institution: WUSTL

Research Mentors: Dr. Mayysa Mokalled

Project Title: Developing strategies to reprogram pro-regenerative human astrocytes using both pharmacological and transcriptional approaches

Project Abstract: Spinal cord injury is a debilitating condition because the mammalian CNS cannot regenerate. In contrast, zebrafish can fully recover from a spinal cord transection due to the regenerative abilities of bridging glia. Bridging glia are cells in the spinal cord that undergo epithelial-to-mesenchymal transition (EMT) and acquire an elongated bipolar morphology, which allows them to connect the severed ends of the spinal cord after injury.

Here, we attempt to reprogram human fetal astrocytes (HFA), a type of mammalian glia with the molecular signature closest to bridging glia, into bridging glia by shifting their morphology toward decreased branching and increased cell length. To achieve elongation, HFAs were treated with key bridging factors activated during EMT or allopregnanolone, a progesterone-derived neurosteroid expressed by glia. Elongation was assessed via branch length analysis. This project provides a potential approach for increasing the regenerative capacity of the human CNS.

Monica Jensen

Research Experience Institution: Salk Institute for Biological Studies

Research Mentors: Nicola J. Allen, Ashley Brandebura

Project Title: Characterization of the onset and progression of astrocyte reactivity in relation to neuropathology in amyloid- and tau-based models of Alzheimer's disease

Project Abstract: Astrocytes play an important role in regulating neuronal synapse formation, function, and elimination. One mechanism by which they modulate neuronal synapses is through the release of a variety of secreted proteins that act at the synapse. In Alzheimer's disease there is astrocyte dysfunction that may contribute to the progressive synapse loss and memory impairments characteristic of the disease. Astrocytes in Alzheimer's disease transition to a reactive proinflammatory state, which involves morphological rearrangement of the intermediate filament protein, glial fibrillary acidic protein (GFAP), in astrocyte processes. However, it is still an open question whether astrocyte reactivity is causal to disease progression or whether they are responding to the surrounding pathology. To further study this, we are characterizing the onset and progression of astrocyte reactivity in two commonly used Alzheimer's disease mouse models, APP/PS1 and Tau*P301S. Each mouse line was crossed into the Aldh1L1-Cre line to allow for Cre-dependent targeting of astrocytes in future intervention studies. Three different time points (4, 6 and 9 months) were analyzed to pinpoint the onset of astrocyte reactivity in relation to the onset of amyloid (APP/PS1 model) and tau (Tau*P3001S model) pathology. We are using immunohistochemistry to compare GFAP immunoreactivity, plaque density, and hyperphosphorylated tau. These data will provide insight on the onset and progression of astrocyte reactivity in relation to the onset of neuropathology in amyloid and tau-based models of Alzheimer's disease. Based on these findings, future intervention studies will be performed prior to the onset of astrocyte reactivity that will attempt to ameliorate astrocyte reactivity and slow disease progression.

Noah Kabbaj

Research Experience Institution: Washington University in St. Louis

Research Mentors: Dr. Jordan McCall, Dr. John Bilbily

Project Title: Preliminary data suggests repeated electroconvulsive shock increases c-Fos activation of mouse parvalbumin interneurons in the hippocampus and prefrontal cortex

Project Abstract: Electroconvulsive therapy (ECT) has been used for more than 80 years as a highly effective treatment for drug-resistant psychiatric disorders such as depression, bipolar disorder, schizophrenia, and catatonia. Despite this treatment's remarkable efficacy, its mechanism of action remains unknown. One hypothesis proposes increased GABAergic neuronal activity drives ECT's therapeutic effects. Here, we sought to determine whether parvalbumin-expressing (PV) GABAergic neurons are activated by repeated electroconvulsive shock (ECS) in mice under 3% isoflurane. We compared animals receiving ECS to Sham controls. The ECS mice (n=2) received ECS every other weekday for a total of 7 sessions, while the Shams (n=2) received the same treatment with the exception of ECS. We then perfused mice and extracted and stained the prefrontal cortex and hippocampus for PV, c-Fos (an immediate early gene that serves as a marker for neuronal activity), and DAPI (a stain that marks all nuclei). In the hippocampus, ECS increased the number of cells labeled with c-Fos (21.4% ECS vs. 2.17% Sham) and PV colocalizing with c-Fos (31.2% ECS vs. 17.1% Sham) when compared to Shams. In the prefrontal cortex, ECS did not change c-Fos (29.4% ECS vs. 28.5% Sham), but selectively increased PV neuron activation (27.5% ECS vs. 6.89% Sham) compared to Shams. Our results suggest that repeated ECS increases PV activity in the mouse hippocampus and prefrontal cortex. Though a small n limited our study, and results will

have to be validated in a larger experiment, these preliminary results appear to provide support for the GABAergic hypothesis for ECT.

Naru Kang

Research Experience Institution: University of Maryland, College Park

Research Mentors: Matthew Roesch

Project Title: Neural signals in nucleus accumbens are amplified during cognitive control

Project Abstract: The nucleus accumbens (NAc) acts as the limbic-motor interface by receiving input from limbic system structures and producing a signal output that biases the direction and intensity of behavior. The NAc is composed of two primary subregions called the core and the shell. It has been proposed that the core mediates a "go" response toward motivationally relevant stimuli and the shell mediates a "stop" response toward behaviors that may interfere with goal accomplishment. Given the different functions of the NAc core and shell, we hypothesized that single-unit neural recordings from the core and shell will show significant differences during a Stop-Signal task that assesses motor impulsivity and cognitive control. The Stop-Signal task is comprised of majority GO trials with several STOP trials interspersed throughout. The GO trials require rats to respond with a lever press on the side that corresponds to the directional light cue, while STOP trials require rats to refrain from making an initial response and then redirect their behavior when the first directional cue is followed immediately by a second directional cue. Our data showed that the directional response signals of NAc are amplified during STOP trials and that an incorrectly performed trial was followed by a reduction in NAc signals in the next trial, which demonstrate that the NAc plays a role in inhibiting and redirecting behavior. Additionally, the post-error modulation of firing was stronger in the core compared to the shell, which demonstrates that the core subregion of the NAc is involved in cognitive control following an error trial in the Stop-Signal task.

Javier Kelly Cuenca

Research Experience Institution: Washington University in St. Louis

Research Mentors: Weihua Li, Paul H Taghert

Project Title: Examining Paralogous *Drosophila* GPCRs: Investigating Potential Roles of Neuropeptide DH31 Receptor #2

Project Abstract: G protein-coupled receptors (GPCRs), essential cell surface receptors, are known to respond to various ligands and hormones. In *Drosophila*, the neuropeptide diuretic hormone 31 (DH31) and its two paralogous receptors, DH31-R1 and DH31-R2, bear resemblance to the well-studied CGRP and calcitonin signaling systems of mammals. Recent investigations of the DH31-R1 have emphasized its potential role in regulating temperature preference rhythms, sleep patterns, and locomotor behaviors. This research focused on understanding the *in vivo* role of DH31-R2 by studying a complete loss-of-function receptor mutation (*CG4395#13B*) created by Scot Waddell's laboratory (Univ. Oxford) and assessing its impact on sleep, locomotor behavior, and geotaxis. Preliminary results revealed that the *CG4395#13B* mutation slightly broadened the evening locomotor peak (N=1; n = 16 flies), indicating possible regulation of activity patterns. Additionally, the mutation exhibited an increase in total daily sleep (N=1; n = 16 flies). Furthermore, I observed a slight trend towards reduced negative geotaxis, in the mutant flies (N = 1; n =75 flies). These findings potentially suggest mutation-related trends in behavior regulation. However, further investigations are required to ascertain the reproducibility, significance, and potential genetic rescue of these results by wild-type DH31-R2.

Nila Keri

Research Experience Institution: University of Washington

Research Mentors: Lydia Gordon-Fennell

Project Title: Investigating the Feasibility of Utilizing Fiber Photometry During Cocaine Self-administration

Project Abstract: The number of national overdose deaths involving stimulants in the U.S., has shown a concerning increase (CDC Wonder, 2023). However, cocaine use disorder treatment remains limited. Our goal is to understand the neurobiology of addiction in order to find treatments for addiction. For finding this, we designed an experiment to monitor neurotransmission with fiber photometry technique (new technique) in Wistar rats during one week short access (1hr) and 2 weeks long access (6hr) of cocaine self-administration. Animals had bilateral viral injection (AAV1 CAG-dLight1.3b) and optic fiber implant in the Nucleus Accumbens prior to the self-administer cocaine training. We hypothesize for this experiment that dopamine will increase after an active response for cocaine.The results aligned with previous literature using voltammetry (old technique) reported by Phillips et al, 2003 and Willuhn et al, 2014, indicating dopamine increased following an active response for cocaine in short access and both weeks of long access cocaine self administration. Future studies could utilize fiber photometry in conjunction with other biosensors (such as kLight) for the detection of different neurotransmitters or enabling dual recording involving two biosensors simultaneously within a single brain region; capabilities that voltammetry lacks.

Penelope Lilley

Research Experience Institution: University of Washington

Research Mentors: Katherine Perks

Project Title: Scaling up while cutting down: Increasing NHP subjects with a low-cost home-cage setup

Project Abstract: Nonhuman primates (NHPs) are used to model brain-machine interface (BMI) preclinical research due to their physiological, anatomical, and neurological similarities to humans. Many BMI experiments in NHPs study how neural activity in motor areas of the brain can be used to control devices such as a robotic arm or computer cursor. These experiments typically require well-controlled recording rigs that allow for multiple recording modalities and limit distractions. This setup poses challenges such as costly materials, time-intensive NHP training, and rigorous protocols resulting in lower sample sizes. To address these challenges, we developed an in-cage tablet system that can be inexpensively assembled and paired with complex behavioral assays. This design allows for flexibility as various tasks can be programmed according to the needs of the researcher. Additionally, it is capable of simultaneous collection of data from many NHPs, allowing high throughput data collection. The system automatically dispenses rewards when NHPs complete successful trials. As a proof of concept, we trained a NHP to perform a continuous tracking task designed for feedforward and feedback control computations. This data represents fundamental mechanisms of movement that might inform better BMI design. We found that the NHP successfully learned how to interact with the tablet and progressively mastered trials up to 20 seconds long. We aim to show how our in-cage setup can substitute for traditional rigs to acquire complex behavioral data. Our system will increase reproducible experiments, increase sample sizes, enlarge samples and reduce human BMI translational timelines.

Tiffany Lin

Research Experience Institution: University of Michigan

Research Mentors: Alexander T. Hodge, Christian R. Burgess, Daniel K. Leventhal

Project Title: Characterizing the kinematics of skilled action in a mouse model of DYT1 dystonia

Project Abstract: Dystonias are a group of disorders characterized by abnormal twisting movements due to involuntary co-contractions of opposing muscles. Contractions in task-specific dystonia, a primary focal dystonia, happens during specific activities that usually involve highly skilled and repetitive movements. Emerging evidence shows that these movements may be regulated by abnormal neuroplastic mechanisms. However, primary dystonia has been difficult to study in rodent models as knock-in mice with the human mutant TOR1A gene (DYT1-KI mice) do not exhibit a clear phenotype when tested on classic behavioral tests like the rotarod and simple lever pressing. One explanation is that these behavioral tests can be completed by mice without utilizing corticostriatal or cerebellothalamocortical circuits. Reduced connectivity between these brain regions has been shown by imaging studies to correlate with dystonic motor symptoms. Skilled reaching is a behavior that involves

the corticostriatal and cerebellothalamocortical circuits. We therefore hypothesized that task-specific dystonic behaviors would be revealed in DYT1-KI mice after extensive training in skilled reaching. Here we show that DYT1-KI mice consistently had more "fumbles," where the pellet was lost mid-retrieval. And, while overt dystonic behaviors were not detected, 30% of DYT1 mice displayed abnormal movements. This is consistent with the penetrance of DYT1-dystonia in humans. These results indicate that the human TOR1A mutation is sufficient to generate motor deficits in skilled behaviors. Further, DYT1-KI mice provide an invaluable model to determine the circuit mechanisms that factor into the pathogenesis of dystonia.

Lizbeth Liquidano Cortes

Research Experience Institution: University of Michigan

Research Mentors: Emily Jutkiewicz

Project Title: The Effects of Acute Administration of PN6047 in an Open Field Test

Project Abstract: Opioid overdose has taken more than 560,000 lives between 1999-2020, causing an opioid epidemic in the United States. Chronic use of opioid analgesics induces tolerance and physical dependence. However, opioid withdrawal-induced physical and affective symptoms make it difficult to stop using opioid analgesics. Therefore, the current study evaluated the effects of a novel delta opioid receptor agonist PN6047 on affective-related behaviors in opioid withdrawal *in vivo*. We administered increasing doses of morphine (10-40 mg/kg) or saline to male Sprague-Dawley rats twice/day for 4 days. Approximately 60 hours after the last morphine injection, we injected rats with either saline or PN6047 (s.c.) 30 min before entering the open field arena for 30 min. Time spent in the center of the open field arena and number of quadrants crossed were used as measures of anxiety-like behaviors. Morphine withdrawal alone decreased total quadrant crosses but not time spent in the center as compared with chronic saline treatment alone. PN6047 treatment increased total quadrant crosses and time spent in the center independent of the chronic treatment condition. Overall, our data suggests that the delta opioid receptor agonist PN6047 produces anti-anxiety-like effects and increased locomotor activity in both control and morphine withdrawn rats. This work will allow us to continue investigating further novel treatments to alleviate the affective symptoms of opioid withdrawal.

Nawshin Maleeha

Research Experience Institution: Vanderbilt Brain Institute, Vanderbilt University

Research Mentors: Dr. Bruce Carter, Dr. Vishwanath Prabhu

Project Title: Investigating the p75 Neurotrophin Receptor Signaling Pathway in Schwann Cells

Project Abstract: The regulation of lipid metabolism in Schwann cells is critical to proper myelin formation and sensory neuron survival in the peripheral nervous system. Previous research from the Carter Lab identified the importance of p75 neurotrophin receptor (NTR) expression for the regulation of lipid metabolism in Schwann cells, finding that Schwann cell-specific deletion of p75NTR resulted in disruptions in cholesterol biosynthesis and 30% loss of dorsal root ganglion neurons. Despite this discovery of p75NTR's role in Schwann cells, the signaling pathway by which p75NTR activates lipid metabolism genes is not fully understood. Previous studies in hepatocytes reported that neurotrophins like nerve growth factor (NGF) and brain-derived neurotrophic factor (BDNF) activate sterol regulator-element-binding protein-2 (SREBP2), involved in regulation of lipids and cholesterol-associated genes, through p75NTR activation of p38 MAP kinase and caspases. Therefore, we investigated SREBP2 activation by p75NTR via a similar downstream signaling cascade within Schwann cells. We treated wild-type rat Schwann cells with BDNF for 1 hour, 3 hours, 6 hours, and overnight to activate the p75NTR response. At each time point, we quantified the protein expression level for various proteins hypothesized to be involved in the p75NTR signaling pathway, such as p38 MAPK, caspase-2, and SREBP-2. If involved in the pathway, we predict that BDNF treatment will increase the active form of these proteins: phosphorylated p38 MAPK, cleaved caspase-2, and cleaved SREBP-2. Determination of the p75NTR pathway in Schwann cells will be fundamental to understanding and intervening in various peripheral neuropathies that relate to Schwann cell lipid dysfunction.

Shayne Mayo

Research Experience Institution: University of California, San Diego

Research Mentors: Dr. Kim Dore, Dr. Yixing Du

Project Title: Understanding Long-Term Depression in Alzheimer's models

Project Abstract: While extensive research has been completed regarding long-term potentiation and Alzheimer's effect on LTP, there is little consensus in the literature regarding long-term depression in Alzheimer's disease models. Furthermore, little research is completed in older rodents (most results found in the literature are using three-week-old male mice). It has been previously established that NMDA receptors can induce LTD without ion-flux and thus have a metabotropic function. To address the lack of understanding regarding LTD research, we have begun a careful characterization of LTD in older WT and APP/PS1 mice and to test the effect of blocking NMDA receptor ion-flux. We thus performed field EPSP recordings in the CA1 hippocampal region of 15-20 months and 3-4 months old mice. Experimental groups were separated by sex and by genotype, with and w/o NMDA antagonist L689560, used to block ion flux dependent LTD. In these experimental groups, LTD was induced using paired-pulse low frequency stimulation protocols of 50 ms and 200 ms paired-pulse intervals (with 900 stimulus pairs per protocol). We found that there was no LTD expression at all in 15-23 months mice across all the conditions we tested. However interestingly, LTD was found to increase during the induction phase of stimulation for the group treated with L689560. Furthermore, we observed LTD expression in the younger mice (3-4 months). These findings would suggest that LTD in early stages of Alzheimer's disease limit the ability to perform this needed function as age (and the disease) progresses. Understanding the factors behind Aβ driven depression can potentially lead to developing treatments that might rescue this crucial brain function.

Maylyn Mei

Research Experience Institution: Vanderbilt University

Research Mentors: Alisa Zoltowski, Carissa Cascio

Project Title: The Development of Face Processing Related Brain Structures in Individuals with Varying Likelihoods of Autism

Project Abstract: The mid-fusiform sulcus (MFS) divides the fusiform gyrus (FG), responsible for higher visual perception, into its medial and lateral sections, identifying functional regions such as the fusiform face area (FFA). The MFS is an anatomical landmark that strongly predicts the presence of the FFA, thus it allows us to study the neural development of face processing and recognition in those who are unable to complete face perception tasks. The first few years of life are critical to face learning; thus, we will analyze structural MRI scans of 503 six, twelve, and twenty-four-month-old infants with differing likelihoods of autism to determine when the MFS develops in relation to when they learn to process and recognize faces. We will calculate the FFA's cortical thickness (CT) and sulcal depth (SD) by i.) tracing grey matter & white matter boundaries and ii) using these boundaries to compute the corresponding distances. At six months, the majority of infants had developed the MFS, though the MFS on the left hemisphere was identified more than the right. Those later diagnosed with autism did not have a significant difference in MFS development than those who were not.

David Melendez-Perdomo

Research Experience Institution: Scripps Research Institution

Research Mentors: Lisa Stowers, Caitlin Miller

Project Title: Female Mice Reproductive State Alters Response to Social Stimuli

Project Abstract: An animal's internal physiological state influences how they respond to external stimuli. This is important in the context of social communication. In mice, major urinary proteins (MUPs) act as important social signals in urine scent marks that encode information regarding the sex, identity and condition of a given mouse. Prior work has revealed that female reproductive state shapes behavioral responses to these social stimuli. However, there is not a well-developed behavioral response that could be used to investigate this phenomenon

in depth. In our project, we establish a behavior that varies only in regard to female reproductive state. Using a two-chamber preference assay, we found that isolated rMUP20 elicits different responses in mice depending on whether the female mouse is in estrus, diestrus, or is pregnant. Pregnant and diestrus mice had a tendency to avoid rMUP20, while mice in estrus had a tendency to investigate rMUP20. Our results demonstrate that female reproductive states can impact responses to external stimuli in a controlled, repeatable manner. The behavior we have uncovered in this project can be further used to investigate female internal physiological state. In the future this behavior can be used in combination with techniques such as mini scopes, genetic knockouts, and hormonal modulation in order to uncover the mechanisms behind how this phenomenon occurs.

Rachel Membreno

Research Experience Institution: Washington University in St. Louis

Research Mentors: Jeffrey M. Zacks, Maverick E. Smith

Project Title: Whose Memory Is Improved by Attending to Event Structure? No Evidence for Modulation by Attentional Control or Episodic Memory Ability in Older Adults?

Project Abstract: Memory is important for learning and understanding everyday events in continuous activity. Evidence shows that individuals come to understand and remember continuous activity by segmenting it into its constituent parts: Attending to how one segments a continuous activity into events improves memory in young adults (Flores et al., 2017). We investigated whether attending to event segmentation improves memory in older adults, and whether measures of attentional control and episodic memory predicts who benefits from the intervention on segmentation. The Attentional Control Hypothesis predicted that older adults with low attentional control would benefit more from the intervention. In contrast, the Representational Substrate Hypothesis predicted that older adults with high episodic memory would benefit more from the intervention. One hundred sixteen cognitively healthy older adults (M = 72.89, SD =6.04) intentionally encoded four videos for a later memory test. We then randomly assigned participants to either segment videos into the smallest units that seem natural and meaningful to them or intentionally encode four more videos. Participants completed a free recall test at four different delays: 30 minutes to 4 weeks after encoding the videos. Additionally, participants completed cognitive tests of attentional control and episodic memory. Attention to event segmentation did not increase the amount of information older adults recalled. Suggesting that attention to segmentation may not improve memory in older adults. Further, we found no evidence that measures of attentional control and episodic memory predicted who benefits more from attending to segmentation.

Keydy Mendez

Research Experience Institution: Temple University

Research Mentors: Arrington Polman, Ames Sutton Hickey

Project Title: Determining the Behavioral Adaptations of Mice to Variable Food Availability

Project Abstract: Eating disorders (ED) are deadly psychiatric illnesses characterized by severe and persistent disturbances in eating behaviors. These disorders include anorexia nervosa, binge eating disorders, bulimia, and avoidant restrictive food intake, and can all significantly impair physical, psychological, and social function. Researchers have started to explore the impact of food insecurity (FI) on eating disorder prevalence. Despite studies suggesting that ED propensity might increase in response to FI, few studies to date have attempted to investigate the impact of FI on subsequent feeding behavior in animal models. Here, we sought to determine how unexpected food availability impacts mouse behavior, with the overarching goal of establishing a FI behavioral paradigm in mice that can be used to investigate the impact of FI on maladaptive feeding behaviors. To this end, we leveraged feeding experimental devices (FEDs) to both randomly limit and measure food intake in mice, while also measuring body weight and physical activity. We hypothesized that FI would decrease body weight in mice due to decreased food intake. Our preliminary findings suggest that FI mice decrease their overall food consumption following removal from the paradigm due to decreased food motivation. Experiments are ongoing to determine how FI impacts physical activity. Taken together, these studies demonstrate a novel FI behavioral

paradigm in rodents that has the potential for elucidating the impact of FI on current and future feeding behavior.

Joyce Milandu

Research Experience Institution: University of Maryland, College Park

Research Mentors: Dr. Edward Bernat

Project Title: Brain Measures of Shared Variance between internalizing and externalizing psychopathology

Project Abstract: P300 component amplitude from event-related potentials (ERPs) has been widely observed to be reduced in association with externalizing (EXT; substance use and antisocial behavior) and internalizing behaviors (INT; depression and to a degree for anxiety), as well as thought disorders such as schizophrenia. The shared variance between INT and EXT behaviors, referred to as a general psychopathology factor *p (p*-factor), has been shown can mediate P3 amplitude reduction (P3AR) associated with internalizing and externalizing (Bernat et al., 2020). Recent work, from our group and others, has indicated that ERPs can be understood as a mixture of time-frequency components delta and theta (Bernat et al., 2011; Bernat et al, 2015, Harper et al., 2014). The aim of the present project is to assess the role of theta in the observed P3 amplitude reduction related to the p-factor. The present project utilizes the same data as previously published for the time-domain P3 (Bernat et al., 2020), which contained 125 participants (70 females, 55 males: M = 20.01 years, SD = 3.77 years) who completed a visual oddball paradigm. Time frequency theta activity was extracted using time frequency principal components analysis (tfPCA; Buzzell et al., 2022) for target stimuli to assess the shared and unique variance between theta and the previously reported P3 in relation to the *p*-factor. Pearson correlations indicated that both target P3AR (r = -.195) and target theta for (r = -.237) were related to *p*-factor. Multiple regression was used to assess shared and unique variance by comparing models with P3 alone, and with theta. R2 change between the models indicated theta added significant incremental prediction ffor *p*-factor relative to P3 alone (R-sqaured change: .03, p < .03). The model with both indicated that theta shared variance with P3 but did maintain significant unique variance in relation to p-factor (t–2.52, p<.034), while P3 did not maintain significant unique variance relative to theta (t = -1.53, p < .129). The present project implicates theta in this process, suggesting that *p*-factor involves mechanisms related to both P3 and theta. Medial-frontal theta has been strongly implicated in attention, salience, and cognitive control, suggesting that these functions may be measurably implicated in elevations of general psychopathology.

Sara Morcos

Research Experience Institution: Washington University in St. Louis

Research Mentors: Ream Al-Hasani

Project Title: Activation of dynorphin cells in the dNAcSh inhibits fentanyl consumption

Project Abstract: The opioid epidemic is one of the most prominent and worst drug crises in American history with statistics from 2021 showing an increase of ~15 % in drug overdose compared to 2020. Specifically, drug-related deaths resulting from synthetic opioids (primarily fentanyl) increased by 23% in 2021, the highest out of all drug categories (Centers for Disease Control and Prevention, 2022). However, the underlying mechanisms by which the brain influences reward and motivation leading to behaviors such as drug abuse remains unclear. The endogenous kappa opioid receptor (KOR) has been identified as a neuromodulator system regulating reward and motivated behaviors by mediating dysphoria and negative affective behavior (Carlezon et al., 2006). KOR and its endogenous neuropeptide ligand dynorphin, are found in high levels in the nucleus accumbens (NAc) (Anderson and Becker, 2017). Our lab is particularly interested in parsing out the role dynorphin and KOR plays in reward behaviors in the NAc. In 2015, we demonstrated that distinct subregions of dynorphin cells in the nucleus accumbens shell (NAcSh) drive opposing behaviors with the vNAcSh inducing aversive behavior and the dNAcSh driving appetitive behavior, via KOR activation. To follow up from these findings we wanted to determine the functional role of dynorphin in mediating reward. Therefore, we hypothesized that driving dynorphin release in the dNAcSh may play a role in fentanyl consumption. In our experiment, mice underwent a two-bottle choice preference test with saline or fentanyl. We show that mice choose to consume fentanyl rather than saline. We

use a chemogenetic approach to show that upon activation of dynorphin expressing cells in the dNAcSh fentanyl consumption is inhibited. This suggests that activation of dynorphin expressing cells dNAcSh are so rewarding that the mice no longer seek fentanyl reward. These findings reveal a novel role for the KOR/dyn system in reward behavior.

Tendayi Mpofu

Research Experience Institution: LSUHSC-NO Neuroscience Center of Excellence

Research Mentors: Dr. Jorgelina Calandria, Dr. Nicolas Bazan, Dr. Allison Augustus-Wallace

Project Title: Maresin 1 Changes Reactive Microglia from Pro-Inflammatory to Pro-Survival States in a 6HODA Model of Parkinson's Disease

Project Abstract: Parkinson's disease (PD) is a progressive neurodegenerative disorder that affects the dopaminergic neurons in the substantia nigra. Microglia, the resident macrophage-like cells located in the central nervous system, mediates synaptic pruning, perform phagocytosis of cellular depositions and waste, and release pro and anti-inflammatory responses contributing to neurodegeneration or neuroprotection. Microglia become reactive upon stimulus from neurons or astrocytes determining the type of phenotype these cells acquire. These phenotypes modulate defensive or neuroprotective efforts to modulate neuroinflammation. The pro-inflammatory phenotypes exhibit cytokine responses, while the pro-survival ones are accompanied by high LC3-associated phagocytosis (LAP) that scavenges debris and unfolded fibrillar subproducts like alpha-synuclein fibrils. These two phenotypes corelates with morphological changes. Here we propose that DHA derivative Maresin 1 (Mar1) induce the second step in the polarization to enhance the activation of the LAP phagocytic state, leading to a decrease in the inflammatory signals and a change in the morphology of the microglia in the sustantia nigra. This hypothesis was tested *in vivo* in a 6- hydroxydopamine (6-HODA) toxicity rat model and "in vitro", in adult rat brain cultures of microglial cells treated with Tumor necrosis factor (TNF) and interferon alpha (IFNα) or alpha-synuclein (α-syn) fibrils to induce classical activation. In rat culture microglial cells, we used immunocytochemistry to detect p65 nuclear translocation and LC3 vesicles. Mar1 induced a decrease in p65 translocation, elicited LC3-phagocytosis as it was observed by the increase in the LC3-positive vesicles. To confirm these findings, we recorded the changes in phagocytic activity of α-synuclein fibrils tagged with pHRodo, a molecule that changes fluorescent wavelength emission when it reaches the lysosomal lower pH, using Incucyte real-time imaging system. In the 6HODA toxicity model, immunohistochemistry using IBA1 to detect microglial cells in different areas of the rat brain showed that microglia were more abundant, and the shape resembles more to pro-inflammatory when rats treated with saline than when treated intranasally with Mar1. Altogether these data points to a pro-survival role of Mar1 in the polarization of microglia that lay to road to future therapeutical developments for PD.

Emma Nicolaysen

Research Experience Institution: Michigan State University

Research Mentors: Andrew Umstead, Jared Lamp, Irving Vega

Project Title: Profiling and Prioritization of Plasma Biomarkers in Black versus White Females living with Cognitive Impairment

Project Abstract: Alzheimer's disease (AD) is a complex neurodegenerative disorder whose pathophysiology causes irreversible cognitive decline. While many recent studies have searched for plasma biomarkers to facilitate early detection of cognitive impairment (CI), little is known about how race and sex can affect the detection of plasma biomarkers of CI. We hypothesize that there are plasma biomarkers that differentiate females from males with CI, as well as those that differentiate Black females with CI from non-Hispanic White females with CI. To test this hypothesis, we applied a label-free quantitative proteomics approach using plasma samples obtained through the Michigan Alzheimer's Disease Research Center (MADRC). Individuals with CI were divided into two categories: those with amnestic multidomain dementia syndrome and those with amnestic MCI-multiple/single domains. Next, we compared changes in protein abundance in plasma from females and males, and between Black

females and non-Hispanic White females. Western blot and targeted mass spectrometry were used to validate the identified proteins. Gene ontology and protein-protein interaction network analyses provided further information about the biological and molecular function of the identified plasma proteins associated with CI. The findings of this study would lead to a greater understanding of the effects of sex, race, and ethnicity on plasma biomarkers in CI.

Lewis Nunez Severino

Research Experience Institution: Brown University

Research Mentors: Dr. Theresa M. Desrochers, Dr. Nadira Yusif-Rodriguez, Hannah Doyle

Project Title: Neural Activity Patterns Underlying Abstract Sequences in Humans

Project Abstract: Understanding complex patterns in daily life requires the ability to keep track of sequential information. Some types of sequences are "abstract" as they rely on a set of goals rather than the specific content in them. Instead of focusing on the specific items used, the brain must monitor the sequential information by keeping track of steps (e.g., slicing then spreading when making a sandwich). Despite the utility of abstract sequences, our understanding of the neural representations underlying them remains limited. Previous work identified that the rostrolateral prefrontal cortex (RLPFC) is necessary for abstract sequential monitoring in humans during a response task. In monkeys, an analogous area in dorsolateral prefrontal cortex (DLPFC) responded to abstract sequential changes during a no-report task. We tested the hypothesis that human RLPFC responds to sequence changes during the same no-report abstract sequential task. We predicted that neural activity patterns involved in monitoring sequential changes in humans will be similar to those observed in prior studies with monkeys. We conducted fMRI on 23 human participants. Using univariate analyses, we identified brain regions active during certain conditions in the task similar to previous results in monkeys. Then, we employed region of interest (ROI) analyses to identify specific active regions during the task. Ultimately, investigating cross-species similarities in the neural mechanisms underlying abstract sequence monitoring contributes to broader understanding of how we keep track of sequential information.

Alejandra Isabel Pacheco Balzac

Research Experience Institution: Michigan State University

Research Mentors: Dr. Marcia Gordon

Project Title: Effects of amyloid, tauopathy and rapamycin treatment on telomere length in mice

Project Abstract: Alzheimer's disease is a neurodegenerative disorder that affects the ability to obtain new information and maintain a healthy cognitive state. Within the brain, amyloid and tau generate a buildup that is caused by the exertion of tau kinase enzymes that act on tau cells. We hypothesize that if the telomere length does not decrease, there is a possibility that we can preserve the lifespan of cells. Rapamycin is a drug that helps to suppress and regulate the immune system by slowing cell proliferation. In this study, rapamycin will be orally administ ered to 5-month-old mice via their diet. The drug will be administered over a course of twelve months. After this period, the mice will be injected with tau virus and subsequently euthanized at an age of 20 months. The aim of this study is to address the following hypothesis: if rapamycin is administered, then telomere length will be preserved, and the risk of developing Alzheimer's disease will be diminished. If the findings indicate that there is a preservation of telomere length, this study could greatly contribute to the current body of research regarding viable treatments for Alzheimer's disease. Furthermore, these findings could potentially improve the quality of life in patients affected by this disease and provide a cost-effective means of treatment for affected families and the economy.

Kayla Pereira

Research Experience Institution: University of Maryland

Research Mentors: Dr. Elizabeth Redcay

Project Title: Relationship between neural similarity and smiling synchrony in peer dyads of autistic and neurotypical children

Project Abstract: Autism spectrum disorder in youth is associated with social interaction challenges. In previous work, we found that smiling synchronization may be one factor involved in social interaction challenges, as smiling synchronization is reduced in autistic-neurotypical dyads compared to neurotypical dyads and predicts diminished social interaction enjoyment. One factor that may drive smiling synchrony could be neural similarity, which is the alignment in brain activity throughout brain regions between two people. Neural similarity may promote smiling synchronization within a dyad because dyads that process stimuli similarly might also align their emotional responses to those stimuli. The objective is to test the impact of neural similarity on smiling synchronization outcomes in dyads involving neurotypical (NT) and autistic (AUT) youth. Thirty-two youth (ages 11-14, 18 male, 12 female, 2 gender fluid, 9 autistic, 23 neurotypical) completed an MRI scan individually where they watched videos chosen to provoke individual differences in response. Later, participants completed a 20 minute in-person interaction with another participant of the same gender within one year of age (autistic-neurotypical dyads (AUT-NT, n = 7 dyads), neurotypical-neurotypical dyads (n = 8 dyads), autistic-autistic dyads (n = 1 dyad)). During this recorded interaction, dyads completed a video watching task comprised of seven short clips. Smiling from this interaction was then coded by an experimenter unaware of participant diagnosis using the Facial Action Coding System, action units 6 and 12. Synchrony was quantified using cross recurrence quantification analysis on frame-by-frame coded facial expression data with a lag window of ± 2 seconds. To quantify neural similarity, BOLD time series for each partner were extracted from a 268 region-of-interest whole-brain parcellation. Time series were correlated between each region between partners, and the average of these region-by-region partner correlations was computed to determine whole brain similarity. The results indicated there was no significant correlation between neural similarity and smiling synchrony ($r(14) = -0.13$, $p = 0.64$). This finding did not support the hypothesis that neural similarity would relate to smiling synchronization. Future work will test neural similarity and smiling synchrony in a larger sample of autistic and neurotypical youth and examine relations between neural similarity in specific regions of interest and smiling synchrony.

Leo Pereira Sanabria

Research Experience Institution: Michigan State University

Research Mentors: Amy Arguello

Project Title: Cortical circuits and incubation of cocaine craving in adolescent rats

Project Abstract: Adolescence is a critical period when initiation of drug use intersects with brain development. Exposure to drug-associated stimuli can elicit craving for drug, despite long periods of abstinence (incubation of craving). However, few studies have examined the circuits that support craving during adolescence. Using an abbreviated cocaine self-administration (Coc-SA) procedure, we found that adolescent rats display incubation of craving in a cocaine-associated context, which correlated with activation of the prelimbic prefrontal cortex (PrL), a region important for decision making and relapse. To determine if increased PrL activity in adolescent rats resulted from differences in projection density to the basolateral amygdala (BLA), an important region for associative learning and relapse, adolescent and adult rats received infusions of the retrograde tracer Cholera toxin B (CtB) into the BLA (Exp 1). To determine if activation of PrL $\rightarrow$ BLA projections correlates with age-dependent increases in incubation, rats received CtB into the BLA, followed by Coc-SA in a unique context and extinction training in a different context. After 1 or 15 days of abstinence, rats received Relapse Tests in the cocaine context (Exp 2). Tissue was processed for CtB and Cfos expression. Preliminary results from Exp 1 show higher CtB+ cells in the PrL of adolescent rats compared to adults, suggesting that adolescent rats have higher density of PrL $\rightarrow$ BLA projections. For Exp 2, we predict that increased activation of PrL $\rightarrow$ BLA projection will correlate with incubation in adolescent rats.

Matthew Piniero

Research Experience Institution: Temple University & Weill Cornell Medicine

Research Mentors: Dr. Lisa A. Briand, Dr. Anjali M. Rajadhyaksha, Dr. Arlene Martinez-Rivera

Project Title: Sex Differences in the Post-Translational Modification O-GlcNAcylation

Project Abstract: O-GlcNAc is a post-translational modification found on serine and threonine residues that has been identified on over 5000 different proteins. Its function is regulated by two cycling enzymes: OGT (O-GlcNAc Transferase) and OGA (O-GlcNAcase). Although O-GlcNAcylation has been shown to be heavily involved in cancer research, its role within the nervous system remains largely unexplored. A novel form of long-term depression was found within rat hippocampal slices in which increasing O-GlcNAcylation via the OGA inhibitor, TMG (Thiamet-G) (Taylor et al., 2014). This form of LTD was NMDA and PKC independent, but PICK1 dependent. This form of LTD also requires AMPAR GluA2 subunits, interfering with LTP. Preliminary data from our lab has replicated this form of TMG-mediated LTD in mouse nucleus accumbens. Similar to what is seen in the hippocampus, O-GlcNAC LTD in male mice is independent of PKC but dependent on PICK1 and GluA2. However, TMG is inducing LTD through alternate mechanisms in female mice. This project aims to investigate the role of O-GlcNAcylation in mouse prefrontal cortex and nucleus accumbens slices. The goal of this project was to examine any potential baseline sex differences in O-GlcNAc and OGT levels while using cell fractionation techniques to further pinpoint where in the cell they are expressed. Based on preliminary data collected via Western blot analysis, there were no sex differences in OGT at baseline in any region-fractionation pair. However, sex-driven trends were seen in all region-fractionation pairs in O-GlcNAc in which females were expressing higher levels of O-GlcNAc at baseline than males.

Trinidi Prochaska

Research Experience Institution: Washington University School of Medicine in St. Louis

Research Mentors: Dr. Sarah England, Dr. Erin Reinl

Project Title: Examining Oxytocin Receptor Cell Surface Expression

Project Abstract: Oxytocin (OT) is a peptide hormone involved in modulating social behavior and reproductive physiology. It signals through its G-protein coupled oxytocin receptor (OXTR) located within the CNS and peripheral tissues. Prolonged exposure to OT can initiate OXTR internalization leading to differential neuronal responses and insufficient uterine contractility. In this study we aimed to determine whether increasing OXTR surface expression would increase oxytocin responsivity in light of prolonged OT exposure. We hypothesized that having higher surface expression of OXTR would make human embryonic kidney (HEK) 293T cells more resilient to desensitization. To measure plasma membrane expression of OXTR, we transfected HEK293T cells with OXTR constructs containing an N-terminal (extracellular) HA-tag and stained them with phycoerythrin (PE)-conjugated anti-HA antibody, followed by flow cytometry to measure PE fluorescence intensities. We compared WT OXTR to a putative stabilizing mutant of the receptor, D100K, that was predicted to exhibit greater surface expression. D100K cells showed a nearly two-fold increase in OXTR surface expression compared to WT ($p < 0.0001$). After short-term desensitization (20 min), D100K internalized to a similar degree as OXTR, but retained a portion (22%) of cells with higher surface expression than WT. After six and 24 hr periods of desensitization, D100K cells have 10% fewer OT-sensitive cells indicating a larger proportion of D100K cells internalized their receptors than WT. Lastly, to see how internalization affected OXTR signaling we used an inositol 1-phosphate (IP1) assay. After two hours of desensitization, IP1 production by D100K falls to WT-desensitized levels. Together, these findings suggest that higher initial surface expression of OXTR may not be sufficient to resist the desensitizing effects of prolonged OT exposure.

Alexis Reed

Research Experience Institution: Temple University

Research Mentors: Dr. Lisa Briand

Project Abstract: Stress in early life, especially during youth, causes shifts in behavior that can last far into

adulthood. For instance, both boys and females seek out cocaine more often when they are socially isolated during adolescence. Contrarily, recent research from our group has demonstrated that teenage social isolation has a sex-specific impact on opioid self-administration, increasing male mice's drive to take oxycodone while decreasing female mice's motivation to take oxycodone. However, it is not obvious whether this decline in females is brought on by a rise in oxycodone potency or a fall in oxycodone's rewarding characteristics. Oxycodone has impacts on reward in addition to being a potent painkiller, and long-term stress can change one's antinociception. Therefore, the current research aims to investigate how social isolation throughout adolescence affects oxycodone analgesia in both males and girls. We tested the nociceptive response to two dosages of oxycodone during adulthood in mice that were either socially isolated or group housed at weaning using a hot water tail flick assay. Adolescent social isolation had no impact on male mice's baseline pain sensitivity or their antinociceptive reaction to oxycodone. On the other hand, female mice's antinociceptive dose response curve to oxycodone appears to shift to the right in response to social isolation during adolescence.

Joel Rejouis

Research Experience Institution: CUNY, Brooklyn College

Research Mentors: Elizabeth Chua

Project Title: Effects of HD tDCS on Encoding and Judgments of Learning

Project Abstract: As individuals acquire new knowledge, they also evaluate their own learning. Our research aims to investigate the effects of brain stimulation over the prefrontal cortex on encoding and judgments-of-learning. Prior work using conventional 1x1 transcranial direct current stimulation (tDCS) over the frontal cortex in healthy young adults showed stimulation impaired associative encoding, but surprisingly did not show any effects on judgments-of learning. One potential explanation for the lack of effects on judgments-of-learning and surprising direction of the effects on encoding is that the low spatial resolution of conventional tDCS obscured the specific roles of prefrontal sub-regions in encoding and judgments-of learning. The current experiment used High Definition-tDCS to test the roles of the anterior prefrontal cortex (aPFC) versus the dorsolateral prefrontal cortex (DLPFC) in encoding and judgments-of-learning, and to test whether they can be improved with brain stimulation. Participants studied novel word pairs, while receiving active HD-tDCS over the aPFC or DLPFC, or sham HD-tDCS. After each word pair, participants made a judgment-of-learning indicating their confidence in their ability to recognize those word pairs 24 hours later. In a subsequent memory test, participants viewed intact, rearranged, and new word pairs, and were asked to judge each as "intact," "rearranged," or "new." Data collection is ongoing, but repeated measures ANOVAs on preliminary data (N=26) showed fewer false alarms to new word pairs (i.e., new items called "intact") for the aPFC and DLPFC conditions compared to sham, which may reflect better encoding. There were no significant effects of stimulation on judgments of learning. Overall, preliminary data indicate that HD-tDCS over different frontal regions improves encoding but does not affect judgments-of-learning.

Sidney Retama-Candelario

Research Experience Institution: Michigan State University

Research Mentors: Kelly Dubois, Ben Combs, Nicholas Kanaan

Project Title: Evaluating Microtubules Binding Properties of Big Tau Protein in Vitro

Project Abstract: Tau is a microtubule-associated protein that is known for its role in regulating microtubule dynamics. This protein is most commonly thought to exist as six major isoforms in the brain. However, there is a seventh isoform called "Big tau" exists, which is created by the inclusion of an additional exon and this form of tau is enriched in the peripheral nervous system. Since its discovery in the early 1990s, very little research was published on the big tau isoform, leaving many gaps in our knowledge. Specifically, a clear understanding of big tau's physiological functions is lacking. The objective of this study is to determine whether there are differences in microtubule binding properties and effects on microtubule polymerization kinetics between big tau and full-length tau isoforms. To test our hypothesis, we created recombinant big tau and the hT40 full-length tau isoform in bacteria and purified them through a series of chromatography steps. We will determine protein concentrations

using an SDS-Lowry protein assay. Then, we will compare the full-length and big tau using SDS-PAGE and Western blotting. Next, we will measure the extent to which full-length and big tau bind microtubules using an in vitro assay. Finally, the purified proteins will be compared in an in vitro microtubule polymerization assay to measure the impact on kinetics. These studies should provide new insights into the differences between big tau and full-length tau in their interactions with microtubules in vitro and begin to establish some of the physiological properties of this understudied form of tau.

Catrina Reyes

Research Experience Institution: Washington University in St. Louis

Research Mentors: Dr. Lili Zhou, Jennifer McAdow, Dr. Aaron Johnson, Dr. Mayssa Mokalled

Project Title: Developing a zebrafish model to study GNAO1-associated neurodevelopmental disorders

Project Abstract: GNAO1 encephalopathy is a rare congenital neurological disorder that causes a spectrum of debilitating symptoms including developmental delay, epileptic seizures, and abnormal movements. However, in the absence of a model organism that faithfully manifests any of these presentations, we chose to model gain-of-function mutations of GNAO1 encephalopathy in zebrafish. GNAO1 encodes the G protein subunit Go and is the most abundant membrane protein in the mammalian central nervous system, making up nearly 1% of membrane protein in the brain. Zebrafish are extensively used to model human diseases and importantly, the zebrafish Gnao1 protein has 80% homology with the human protein. Two lines were used to study the various symptoms associated with this disorder – an inducible overexpression line and a G203R knock-in line. The G203R mutation has been associated with gain-of-function GNAO1 encephalopathy and movement disorder presentations in humans. For each line, three behavioral studies were then performed to assess swim activity: open field test, light-dark cycle stimulation, and acoustic startle response. These assays were performed in five conditions: egg water as a control and four varying doses of Pentylenetetrazol (PTZ), a known convulsive agent. This study aims to develop novel GNAO1 disease models and to gain insight into the functional effects of these genetic disruptions on motor development.

Camille Reynoso Fernandez

Research Experience Institution: CUNY Brooklyn College

Research Mentors: Mariana P. Torrente

Project Title: Histone PTM crosstalk in a yeast ALS/FTD model

Project Abstract: Amyotrophic lateral sclerosis (ALS) and Frontotemporal Dementia (FTD) form a fatal, incurable neurodegenerative disease continuum involving the death of neurons. Previous work in our lab has discovered that epigenetic mechanisms-namely histone post-translational modifications (PTMs)-are connected to ALS/FTD. In particular, we have discovered that the levels of phosphorylation on Histone H3 on Serine 10 (H3S10ph) are increased in yeast models of the disease. The goal of this project is to examine histone PTM levels when Ipl1 (the kinase responsible for installing H3S10ph) is knocked down in yeast. We hypothesize that removing Ipl1 might affect the levels of H3S10ph and as well as other PTMs via crosstalk. Crosstalk between histone modifications occurs when a histone PTM modulates the status of another modification on the same or a different histone. H3S10ph is known to be involved in a few histone crosstalk examples, specifically with H3K9ac, H3K14ac, and H4K16ac. We hypothesize that we should also detect the levels of these PTMs decrease when Ipl1 is knocked down. We will test this hypothesis by way of immunoblotting. We hope that this research will expand our knowledge of epigenetic mechanisms in ALS/FTD and open new avenues for new treatments for this disease.

Natalia Rincon

Research Experience Institution: University of Maryland School of Medicine, Baltimore

Research Mentors: Silvia Grant-Beurmann, Valerie Harrington, Deanna L Kelly, Melanie E. Bennett, Bennett, Lorenzo Leggio, Carolyn Doty, Chamindi Seneviratne, Daniel J. Brady, Brian J. Brandler, Daniel J.O. Roche

Project Title: Comparing Gut Microbiome Diversity and Function Between Individuals with Alcohol Use Disorder and Healthy Controls

Project Abstract: Chronic alcohol use is associated with changes in the amount, type, and function of gut bacteria contributing to increased gut membrane permeability, systemic inflammation, and organ damage. Most studies in this area have examined abstinent individuals with severe alcohol use disorder (AUD) and alcohol-associated liver disease (ALD), or heavy drinkers without AUD. To advance our knowledge on the role of the gut microbiota in AUD without ALD, actively drinking, non-treatment seeking individuals aged 25-65 with DSM-5 AUD were recruited from the general community to participate in a randomized controlled medication trial. Participants were medically cleared to participate through physical exam, having no clinically significant ALD, and completed diagnostic interviews, the Alcohol Use Disorder Identification Test, and various other assessments. Fecal samples were collected, frozen, and stored until sequenced. Regions V3 and V4 of the bacterial 16S rRNA gene were amplified. AUD vs control groups were compared on alpha and beta diversity, controlling for BMI. Individual taxa differences were examined between AUD and control groups, and low risk, hazardous drinking, and AUD groups were created to explore differences in alpha and beta diversity. The AUD group exhibited significantly higher alpha diversity, driven by individuals with severe AUD. The AUD group, vs. controls, had higher abundance of a genus associated with alcohol consumption and obesity, reduced abundance of genera associated with anti-inflammatory processes, short chain fatty acid production, and healthy diet, and a functional reduction in a folate synthesis pathway. These findings suggest individuals with AUD without ALD show gut dysbiosis.

Luz Beatriz Rivera-Agosto

Research Experience Institution: University of Puerto Rico, Río Piedras Campus

Research Mentors: Esther Peterson Peguero, Ph.D.

Project Title: The role of neural receptors in Inflammatory Breast Cancer and metastasis to brain.

Project Abstract: The role of neural receptors in Inflammatory Breast Cancer with metastasis to the brain Inflammatory breast cancer (IBC) is a highly aggressive breast cancer subtype, known for its rapid onset, high metastatic potential, and resemblance to acute breast inflammation. The exact mechanisms triggering its aggressive metastasis remain unclear. Meanwhile, N-Methyl-D-Aspartate receptors (NMDA), ion channel receptors primarily found in the central nervous system, play a role in synaptic plasticity and neural memory, activated by the neurotransmitter glutamate. Recent studies show NMDA receptors in IBC cell lines like SUM149PT and SUM190PT, suggesting a link to brain metastasis predisposition. Aberrant receptor expression in IBC cells may have genetic roots. To comprehend the disease's biological processes, systematic gene interaction and regulation studies are vital. It's also hypothesized that IBC cells secrete L-glutamate, possibly enhancing tumor growth via autocrine signaling. The main hypothesis is that NMDA receptor expression in IBC cells directly affects brain metastasis. Previous research indicated NMDA receptors in SUM149 and SUM190 cells and their sensitivity to the antagonist MK-801, used in neurodegenerative disease treatment. The exact mechanism in IBC remains unclear. To investigate, we'll characterize signaling pathways affected by NMDA receptor agonists (glutamate) and antagonists (MK-801) on IBC cells. Cells will be cultured under four conditions: untreated, treated with L-glutamate, MK-801, and both. The aim is to observe proliferation, viability, and migration, constructing a dose-response curve depicting glutamate concentration and cell viability. Wound-healing assays will reveal cell motility under L-glutamate and MK-801 influence.

Amanda Rodriguez

Research Experience Institution: University of Puerto Rico

Research Mentors: Carmen Maldonado Vlaar

Project Title: Effects of endocannabinoid system activation through exercise on sociability in adolescent rats

Project Abstract: Several studies have found that the endogenous cannabinoid system (eCs) regulates some behavioral pathways that could help develop an adolescent into a functional adult. Some of these investigations have shown that an incrementation of anandamide (AEA), through the inhibition of fatty acid amide hydrolase

(FAAH), is associated with increased sociability in adolescence. Other studies have shown that there is a correlation between exercise and increased anandamide in some areas of the brain. With this association, we hypothesized that, through an up-regulation of high levels of anandamide within the amygdala and the Nucleus Accumbens (NAcc), exercise will be increased, and there will be an increment of sociability in adolescent rats that exercise. Initially, we used sixteen Sprague Dawley male (16) rats that were divided into sedentary and exercise groups. These groups were further subdivided into four (4) groups, where two groups received vehicle or treatment of the inhibitor of FAAH, URB597 (0.1 mg/kg, i.p) and wheel running exercise for ten (10) consecutive days, and the other two groups received vehicle or URB597 while being sedentary. On the last day of the experiment, the rats were submitted to a sociability test for (15) minutes in which behavioral parameters like pinning and contact behavior were recorded. At the end of the sociability test, animals were euthanized, and the brains were collected for histological purposes. Brain regions such as the amygdala and Nacc were selected for future biochemical analysis. Preliminary results revealed that non-sedentary animals exposed to URB597 treatment exhibited an increase in exercise behaviors. With regards to sociability scores, rats that exercised showed more social behavior parameters when compared to the sedentary groups. The present study suggests that exercise seems to be increased in adolescent rats that were treated with our target drug and exercise appears to be correlated with sociability in adolescent rats.

Fabiana Rosado Rodríguez

Research Experience Institution: UPR Medical Sciences Campus

Research Mentors: Dr. Jennifer Barreto Estrada

Project Title: Extinction-like behavior and BDNF expression of female rats in the absence of extinction training

Project Abstract: Opioid abuse disorder is one of the cognitive disorders that significantly affects the CNS, and its sustained use may lead to drug dependency despite harmful consequences. Over 75% of drug-related deaths in the year 2021 were associated with opioid use (CDC). The most recent opioid overdose death statistics (2020-2021) show that 29% of synthetic opioid related overdose deaths were among men, while women accounted for 11% of the total figure (NIDA, 2023). Even with that difference, it has been observed that women more frequently use prescribed opioids in the United States, due to their higher likelihood of experiencing more pain. It has been shown that women have a greater dependence on this type of opioid, but they represent less than 30% of reported deaths. To understand the behavioral and neural basis of opioid addiction in males and females, we have established an animal model of addiction for the extinction of maladaptive behaviors. Previously, we demonstrated that male rats that extinguished drug-seeking behavior after undergoing both morphine-induced conditioned place preference (CPP), and extinction training, showed increased transcription of brain-derived neurotrophic factor (BDNF) in the ventral striatum/nucleus accumbens (VS/NAc). Also, increased BDNF protein expression was observed in the hippocampus (HPC) of males and females. Furthermore, females that did not receive extinction training (sham-extinction), showed a higher percentage of animals that extinguished CPP compared to males. Therefore, with this project we seek to better characterize: 1) the percentage of female rats in the sham-extinction group that extinguished CPP according to the estrous cycle, 2) compare their withdrawal symptoms, and 3) determine BDNF expression. Preliminary data show higher BDNF expression in the HPC of females that extinguish CPP in the absence of extinction training. We hypothesize that females in the diestrus stage of the estrous cycle, where lower levels of estrogen are present, will be more likely to extinguish their morphine CPP. Our study will contribute to determine whether the absence of extinction training is less effective for females when compared to males, and whether this is attributable to hormonal variations.

Michelle Ruiz

Research Experience Institution: University of California, Davis

Research Mentors: Dr. Gene Gurkoff, Dr. Ali Izadi

Project Title: Spontaneous Seizures and Altered Neural Oscillations Following Acute Intoxication with DFP

Project Abstract: Exposure to organophosphate (OP) neurotoxins, developed as pesticides and adapted as

chemical threat agents, results in hundreds of thousands of deaths annually due to accidental and intentional poisonings. Acute OP intoxication causes cholinergic toxicity and status epilepticus (SE) within minutes and can result in the development of spontaneously recurring seizures (SRS), ongoing neurotoxicity and neurological symptoms, including cognitive impairment. A common laboratory model of acute-OP intoxication is the systematic administration of diisopropylfluorophosphate (DFP). DFP triggers acute SE in male rats, and SRS develops in most animals over the first week post-intoxication. However, there are limited data related to long-term seizure frequency and cognitive outcomes, and it is still unknown why only a subset of rats develop SRS. DFP intoxication leads to cell death and neuroinflammation throughout the hippocampal circuit, causing dysfunction in the hippocampal network, potentially affecting oscillatory activity. We hypothesize that early changes in theta oscillations following acute intoxication will increase the development of chronic SRS and cognitive impairments. We used adult male rats injected with DFP (n = 21) to record neural oscillations from intracranial electrodes implanted in the hippocampus and prefrontal cortex. Electrophysiology was recorded before and after they were injected, and they were continuously monitored for seizures every day and changes in oscillatory activity across days 1, 3, 7, 14, 21, 52, and 90. We used the Barnes Maze Spatial Learning Task to analyze cognition over 4 days with 2 trials per day, and analyzed latency to see how long it takes the rats to figure out where the escape box is. Preliminary correlations suggest that there are links between oscillations, seizures, and learning. Altered theta oscillations are associated with more SRS, and more SRS are linked to impaired spatial learning.

Caleb Ryce

Research Experience Institution: University of California, Davis

Research Mentors: Jessie Badley, Dr. Pamela Lien

Project Title: 2, 4, 4'- trichlorobiphenyl (PCB 28) alters neuronal morphogenesis in sex-segregated primary cortical neuron-glia cocultures

Project Abstract: Polychlorinated biphenyls (PCBs) are persistent organic pollutants that can accumulate in lipid-rich tissues. Epidemiological and experimental animal studies have identified PCBs as risk factors for neurodevelopmental disorders (NDDs). Additionally, recent studies have shown that lower-chlorinated PCBs (LC-PCBs) are predominant in contemporary human tissue samples, including breast milk and neonatal brain; they comprise over 70% of the total PCBs found in the serum of pregnant women at increased risk for having a child with a neurodevelopmental disorder. The most predominant LC-PCB found in this study was PCB 28. However, no data is available regarding the developmental neurotoxicity of PCB 28. In this project, we quantified the effect of PCB 28 on neuronal development. Specifically, we tested the effect of PCB 28 on the dendritic and axonal morphology of primary neurons derived from the neocortex of perinatal rat pups. Dendrites were visualized by transfecting cells with a MAP2b-fusRED construct; axons were visualized by immunolabeling the Tau-1 protein. We found that in vitro exposure to PCB 28 decreased dendritic arborization in female, but not male, primary cortical neurons. PCB 28 also decreased axonal outgrowth in male and female primary cortical neurons. These findings suggest that PCB 28 alters axonal and dendritic growth of cortical neurons in a sex- and concentration-dependent manner. These data identify PCB 28 as a potential developmental neurotoxicant that could lead to neurodevelopmental disorders.

Taliana Salcedo

Research Experience Institution: University of Chicago

Research Mentors: T. Salcedo-Rosado, P. Tajalli-Tehrani Valverde, R. Carrillo

Project Title: Examining the role of peripheral perisynaptic glia at the *Drosophila* neuromuscular junction in ALS pathology

Project Abstract: Perisynaptic Schwann cells (PSCs) are the glial component of the tripartite neuromuscular junction (NMJ) and participate in synaptic pruning during development, repair of damaged synapses, and modulation of synaptic transmission. Studies in mice showed that PSCs are altered early in amyotrophic lateral sclerosis (ALS), a neurodegenerative disorder characterized by loss of motor function due to denervation and

eventually motor neuron loss. The lack of genetic tools to target PSCs has hindered progress in uncovering the role of these peripheral perisynaptic glia in ALS mouse models. Recently, a novel glial type, Peripheral Perisynaptic Glia (PPG), was found at the adult *Drosophila* NMJs of the dorsal longitudinal muscles (DLMs). PPG share similarities with PSCs including morphology, spatial organization, and modulation of neural activity. These similarities, and the robust genetic toolbox available in *Drosophila*, make this tripartite NMJ an attractive model to study the role of peripheral perisynaptic glia in ALS. Thus, we have started a genetic screen to identify a GAL4 driver that specifically targets PPG. This tool will enable the characterization of PPG in *Drosophila* ALS genetic models which we hypothesize have altered morphology, number, and spatial organization before motor neuron denervation. Our preliminary data show negative results for the first two enhancers screened (49179>GFP and 49184>GFP). This ongoing screen will help establish the adult *Drosophila* tripartite NMJ as a model to study the role of PSCs in ALS.

Samir Samadov

Research Experience Institution: Brown University

Research Mentors: Dr. Diane Lipscombe

Project Title: Behavioral Phenotyping of Optogenetically-Evoked Sensory Responses

Project Abstract: The rapid development of reversible hypersensitivity to sensory stimuli in skin is protective and is one of the most familiar examples of adaptation of the nervous system to changes in the environment. Assessing rodent behavior in response to various sensory stimuli typically involves manual positioning of sensory probes including von Frey filaments, processes that are labor-intensive and prone to experimenter bias. Remy Meir and colleagues created an automated system to objectively evaluate rodent responses to light-evoked stimulation of nerve endings in skin using optogenetics. The method utilizes mouse models that express a light-sensitive opsin, ChannelRhodopsin2, in specific cell types such as heat nociceptors or low-threshold mechanoreceptors. Mice exhibit classic paw withdrawal reflex responses to light directed at the plantar surface of hind paws. DeepLabCut-Live and high-speed videography were combined to automatically position the light probe and capture high-resolution video of mouse behavior. By varying the light intensity stimulus intensity-behavior relationships were obtained. We used the Visual Geometry Group (VGG) image annotator to classify mouse behaviors including paw shaking, licking, guarding, resting, walking, and flinching. Our manual annotations were 94% consistent between manual annotations and we used these data to train the machine learning model. We compared behaviors across mouse strains and stimulus intensities, and we assessed the accuracy of the machine learning platform to classify rodent behavior. This automated platform allows for optogenetically-induced responses combined with deep behavioral phenotyping. It improves accuracy, increases the quantity and quality of data acquisition and reduces labor. Here we study behavioral responses to sensory stimuli, but the platform can be applied to many other types of studies.

Safa Sheik

Research Experience Institution: Yale University

Research Mentors: Kelley E. Gunther, Elizabeth R. Kitt, Alexis Broussard, Daniel Petrie, Sadie J. Zacharek, Cristina Nardini, Grace Hommel, Alyssa Martino, Tess Anderson, Hannah Spencer, Paola Odriozola, Carla E. Marin, Wendy K. Silverman, Eli R. Lebowitz, Dylan G. Gee

Project Title: A Parent-Focused Intervention for Childhood Anxiety: Are Some Brains More Responsive?

Project Abstract: Anxiety disorders are highly prevalent among children and adolescents (Lebowitz et al., 2014). The Supportive Parenting for Anxious Childhood Emotions (SPACE) intervention targets parental accommodation patterns to treat anxiety in children. Compared to Cognitive Behavioral Therapy (CBT), a commonly used anxiety treatment with a ~50% success rate among youth (Lebowitz et al., 2014), SPACE shows promise as an alternative approach. In this study, we examined the network properties of amygdala-prefrontal cortex (PFC) functional connectivity, a relevant neural circuit in anxiety disorders. We used GIMME to construct networks for each child in the sample using resting-state fMRI data (Gates & Molenaar, 2012). We examined whether the density of

network connections between the amygdala and PFC at baseline predicts the effectiveness of SPACE compared to CBT for reducing anxiety symptoms in children aged 6-12. Our analysis involved 66 children randomly assigned to either SPACE (n = 31) or CBT (n = 35). We measured anxiety symptoms pre and post treatment using the Pediatric Anxiety Rating Scale (clinician report). The results indicated no significant interaction between the number of connections and treatment in relation to symptom change, suggesting that pre-treatment network density does not impact treatment efficacy. Furthermore, neither the treatment condition nor the density metric had a significant main effect on symptom change. Interestingly, SPACE and CBT resulted in similar reductions in symptoms within this sample. To further understand the neural changes occurring during these interventions, future research should incorporate resting-state fMRI assessments at various intervals throughout CBT or SPACE interventions.

Emma Stauffenberg

Research Experience Institution: University of California, Berkeley

Research Mentors: Miriam Hernández-Morales, Koyam Morales-Weil, Chunlei Liu

Project Title: Activating Astrocytes With Magnetogenetics

Project Abstract: Astrocytes are a type of glial cell known to serve several supportive roles in the brain, such as ion homeostasis, protection of neurons from oxidative stress, and structural scaffolding. Additionally, astrocytes play a crucial role in modulating synaptic functions: neurotransmitters released from neurons bind to astrocyte receptors resulting in an increase in astrocytic calcium responses, which in turn leads to a calcium-dependent release of signaling molecules that modulate neuronal synaptic transmission. This modulatory role of astrocytes is influenced by both extracellular calcium and calcium released from their endoplasmic reticulum (ER). However, studying the astrocytic control of synaptic functions has been hindered due to a lack of tools to manipulate their calcium signaling noninvasively with temporal and cell resolution. This study characterizes the magnetogenetic technique FeRIC (Ferritin-Iron Redistribution to Ion Channels) as a noninvasive method to manipulate astrocytes' calcium signaling. FeRIC uses radio frequency (RF) magnetic fields to activate TRPV4 channels coupled with ferritin (TRPV4FeRIC). Using this method, we monitored the calcium signaling in cultured hippocampal astrocytes. Calcium imaging experiments were conducted using genetically encoded calcium indicators. RF stimulation of astrocytes expressing TRPV4FeRIC triggered calcium responses with contributions from both extracellular and intracellular ER calcium stores. Our results support the utility of FeRIC as a noninvasive method to manipulate astrocytic calcium signaling. We propose that FeRIC can be a useful tool to study the role of astrocytic calcium signaling in modulating synaptic functions.

Christopher Stein

Research Experience Institution: The University of Michigan

Research Mentors: Jorge Y. Martínez-Márquez

Project Title: Investigating Whether Mutant Rhodopsin Engages with the BBSome

Project Abstract: Rod photoreceptors are light-sensing cells in the retina which contain modified primary cilium, known as the outer segment. This outer segment compartment is filled with disc-shaped membranes that are densely packed with the light-sensing protein, rhodopsin. Rhodopsin is a 7-transmembrane domain GPCR that is targeted to rod outer segments by vesicular traffic. Mutations that affect rhodopsin protein traffic are known to affect disc formation and will ultimately lead to blindness. The C-terminus of rhodopsin contains signaling motifs that are important for its correct trafficking. One of these is the FR motif found in close proximity to the last transmembrane domain of rhodopsin. In other GPCRs, this FR motif is important to regulate their entry into ciliary compartments. The regulation of ciliary entry of many of these GPCRs has been shown to be executed by a complex known as the BBSome, which ensures the correct ciliary protein population by removing unwanted proteins. The BBS7 subunit of the BBSome is known to be the mediator in the interactions between the BBSome and FR motif-containing GPCRs. Our lab has data that shows mutations in the FR motif of rhodopsin results in mislocalization outside the outer segment. To test whether this mis-localization is due to disrupted interaction

between the BBSome and rhodopsin, we performed immunoprecipitation assays between the C-terminus of rhodopsin and the BBS7 subunit of the BBSome. Our results for these experiments show that the BBSome complex does not interact to rhodopsin's C-terminus, suggesting a different mechanism for the observed mislocalization.

Penelope Stuart-Hurtado

Research Experience Institution: Michigan State University

Research Mentors: Dr. Gina Leinninger

Project Title: Defining the effects of endogenous neurotensin from LHA neurons and their projections

Project Abstract: Obesity affects >40% of the US population and is characterized by excessive food consumption and a sedentary lifestyle that causes weight gain. Yet, incomplete understanding of how the brain controls feeding and movement behaviors has hindered development of weight loss therapies. Experimentally activating lateral hypothalamic (LHA) neurons expressing neurotensin (LHANts neurons) transiently increases water intake and body weight, but over 24 hr it suppresses feeding and increases energy expenditure to promote weight loss. The weight reduction effects, but not the drinking, are mediated by Nts signaling via neurotensin receptor-1 (NtsR1), which is robustly expressed by dopamine neurons in the ventral tegmental area (VTA). Intriguingly, there may be distinct subsets of LHANts neurons that project to different brain areas to mediate drinking vs. feeding suppression. We hypothesized that LHANts neurons projecting to the VTA promote weight loss but not drinking. To test this, we used optogenetics to activate all LHANts neurons or only the subset of neurons projecting from the LHA to the VTA and assessed how they modulate feeding, drinking, moving and body weight. We observed that acutely activating all LHANts neurons does not impact feeding but increases drinking. Conversely, activating only the LHANts neurons that project to the VTA reduced feeding without invoking a drinking response. These data suggest that biasing LHANts neuronal signaling to the VTA may have potential to support weight loss behaviors. Going forward, understanding how central Nts signaling regulates feeding vs. drinking could suggest new strategies to support weight loss and address the obesity epidemic.

Leilani Taiano

Research Experience Institution: Temple University

Research Mentors: Z. Huque, R. Mohyee, B. Elliott, V. Murty, V. A. Mittal, J. Schiffman, L. Ellman

Project Title: A moderated-mediated analysis of childhood trauma and dissociation in CHR psychosis

Project Abstract: Dissociation is a transdiagnostic symptom that occurs in post-traumatic stress disorder (PTSD) and psychosis-spectrum disorders. Dissociative experiences have been found to be associated with psychotic-like experiences in individuals at clinical high-risk for psychosis (CHR) exposed to traumatic life events. Volumetric decreases in the amygdala, hippocampus, and thalamus have been found in humans with PTSD with dissociation, though the neural circuitry underlying trauma and dissociation in CHR has been less studied. We hypothesized that decreased volumes in the amygdala, hippocampus, and thalamus would mediate the relationship between childhood trauma and dissociation, and that this relationship would be moderated by CHR status. N=74 (CHR=17, non-CHR=57) individuals ages 16-30 completed the Childhood Trauma Questionnaire (CTQ) and Dissociative Experiences Scale (DES). CHR status was assessed with the Structured Interview for Psychosis-Risk Syndromes. Volume was extracted from Free-surfer. While significant direct effects between CTQ and DES were observed (amygdala, c'= .0337, hippocampus, c'= .0334, thalamus, c'= .0339, all $p < .05$), indirect effects were not significant ((amygdala, c= .0001, CI= -.0053, .0055), (hippocampus, c= .0016, CI= -.0043, .0094,), (thalamus, c= -.0001, CI= -.0033, .0037)). Furthermore, CHR status did not moderate this relationship (amygdala, c= -.0013, hippocampus c= -.0086, thalamus, c=-.0009, all $p > .05$). Consistent with previous research, we found a significant relationship between childhood trauma and dissociation in CHR, though our findings do not support our hypothesis that decreased volumes in the amygdala, hippocampus, and thalamus are mediators. Limitations include small sample size. Future studies may consider examining white matter integrity to replicate the animal connectivity model for dissociation in human participants.

Tyara Thompson

Research Experience Institution: Washington University in St. Louis

Research Mentors: Justin G. Wang, Dr. Alexxai V. Kravitz

Project Title: Optogenetic Inhibition of Ventral Pallidum GABAergic Neurons Does Not Change Reward Consumption

Project Abstract: High-fat, highly palatable foods possess intrinsic rewarding properties that make them easy to overeat. Though rewarding, overconsumption of high-fat, highly palatable foods can lead to diet induced obesity and various comorbidities. The ventral pallidum (VP) is an area of the brain that is activated during reward consumption. In the current study, we investigated whether reversible unilateral optogenetic inhibition would reduce consumption of 100% coconut oil, a highly palatable reward. We hypothesized that unilateral inhibition of the VP would reduce oil consumption. We injected the inhibitory opsin Archaerhodopsin 3.0 unilaterally into VP and used a transgenic Cre-recombinase mediated approach to selectively target VP GABAergic neurons. Following surgery, VGAT-ires-cre mice were trained on a Pavlovian head-fixed oil consumption task. Oil was dispensed four seconds after a digital tone. Closed-looped optogenetic inhibition using a 5mW or 10mW 532nm laser was triggered by the first lick on every 4th trial (laser on in 20% of all trials). We concluded that inhibition had no effect on coconut oil consumption. Further studies, including the pairing of optogenetic stimulation with the digital tone, are needed to determine the role of VP GABAergic neurons in perceived palatability and consumption.

Giancarlo Tirado

Research Experience Institution: UPR Medical Sciences Campus

Research Mentors: Cristhian Calo, Dr. Carlos Jimenez

Project Title: Intermittent Cocaine Self-Administration Increases Subthreshold Activity in Midbrain Dopaminergic Neurons

Project Abstract: Substance abuse is a recurring and intricate brain disorder marked by drug pursuit despite harmful consequences. The mesocorticolimbic system (MCL), governing pleasure, reward, and motivation, is profoundly impacted by substance abuse. Dopaminergic (DA) neurons, abundant in the ventral tegmental area (VTA) of the MCL, represents a primary target for addictive substances. Hyperpolarization-activated cyclic nucleotide-gated (HCN) channels (HCN1-HCN4) conduct Na+ and K+ ions and significantly influence the intrinsic excitability of dopaminergic neurons in the VTA. This mixed cation current conductance is known as the hyperpolarization-activated cyclic nucleotide current (I_h). The I_h influences neural processes like resting membrane potential and firing frequency modulation. Previous results from our laboratory demonstrated that I_h amplitude and membrane capacitance (C_m) of VTA DA neurons are significantly reduced after cocaine intermittent self-administration (IntA). This paradigm has been documented to produce incentive salience, psychomotor sensitization, and a neurochemical sensitization of the mesolimbic DA system by increasing neuron sensitivity to cocaine. The I_h and C_m reduction after cocaine IntA resulted in increased synaptic integration. However, it is unknown if pairing cues during drug administration are essential in altering VTA DA cells' intrinsic properties. This study investigates the impact of paring cues during passive cocaine administration on I_h in VTA DA neurons, exploring the hypothesis that association to drug cues cocaine modulates I_h and enhances VTA DA cells' synaptic integration. The study employed three animal groups: Cocaine and saline intermittent access self-administration and cocaine yoked cue. Encompassing voluntary and involuntary drug administration behaviors. Following behavioral training, animals were sacrificed, and brain slices with VTA were isolated from their brains. VTA tissue was submerged in artificial cerebrospinal fluid and subjected to whole-cell patch recordings using the patch clamp technique, enabling electrophysiological measurements of ion channel current and voltage in the cell membrane. Our results demonstrate that cocaine IntA produces a significant I_h amplitude reduction. Animals in the cocaine IntA protocol have a significant increase in temporal summation at depolarized and negative potentials. These results suggest that the voluntary associative learning of the drug modulates the I_h of VTA DA neurons and that volitional learning processes could enhance synaptic integration.

Iliana Todorovski

Research Experience Institution: Temple University

Research Mentors: Camille Johnston, Johanna Jarcho

Project Title: Anxiety, Memory Bias, and Social Support during Adolescence

Project Abstract: During adolescence, onset rates of social anxiety peak just as peer feedback increases in its frequency and salience. Socially anxious adolescents have greater engagement in a broad network of brain regions implicated in threat and salience processing during peer feedback including amygdala, insula, medial prefrontal cortex, and ventral striatum. However, prominent theories suggest that negative memory biases for social experiences may also contribute to social anxiety symptoms. Few studies have tested this relation outside of unverifiable autobiographical events. Our lab recently developed the Recall After Feedback Task (RAFT) that overcomes this problem by exposing participants to positive and negative purported peer feedback prior to probing their recall for this feedback. Using this task, we demonstrated that more severe symptoms of social anxiety were associated with a bias towards recalling peer feedback as more negative than positive. However, it is plausible that perceived social support, which buffers against negative affect and anxiety during adverse experiences, may mitigate this relation. To test this, adolescents (N=36) completed the RAFT while undergoing fMRI. Forthcoming analyses will determine the extent to which perceived social support moderates the relation between negative memory bias and anxiety. We will also assess the extent to which brain function during encoding of social feedback influences associations between social support, memory bias, and anxiety. Regions of interest will include structures implicated in threat and salience (e.g., amygdala, insula, medial prefrontal cortex, and ventral striatum) as well as memory-related processes (e.g., hippocampus). Findings will help determine if social support is a protective factor in mitigating expressions of anxiety in adolescents who exhibit a negativity bias.

Pedro Torres Morales

Research Experience Institution: Michigan State University

Research Mentors: Charles L. Cox, Joseph Beatty, Ariana Zimmerman

Project Title: Morphological and Physiological Properties of Thalamocortical Neurons in the Mouse Dorsal Lateral Geniculate Nucleus

Project Abstract: Visual information is relayed from the retina through the dorsal lateral geniculate nucleus (dLGN) to the visual cortex. In the dLGN of higher-order mammals, at least three classes of thalamocortical neurons have been described: X-, Y-, and W-cells. These distinct cell types have unique morphological and physiological features. One distinctive physiological feature of X-cells is that they possess a dendrodendritic synapse from local inhibitory interneurons that can be activated with metabotropic glutamate agonists. Y- and W-cells do not have this synapse. Recent evidence suggests that the mouse dLGN contains X-, Y-, and W-cells similar to higher-order mammals but based solely on morphology. It is unclear whether these morphological subtypes in mice have a similar distribution of dendrodendritic synapses from local interneurons like higher-order mammals. To examine the morphology and physiological properties of mouse dLGN thalamocortical neurons, we performed whole-cell voltage clamp recordings in brain slices from mice between postnatal days 12 to 23. The presence of dendrodendritic synapses was confirmed by an increase in inhibitory postsynaptic currents following the application of a metabotropic glutamate agonist. To verify the morphology of these thalamocortical neurons, a fluorescent dye was included in the recording pipette, and using two-photon microscopy maximum projection images were obtained. Using Sholl analysis thalamocortical neurons were classified as X-, Y-, or W-cells. We then determined the proportion of these specific dLGN cell types that had dendrodendritic synapses. These results are useful to determine if mouse visual information is relayed through similar pathways and circuitry as higher-order mammals.

Cristal M Torres Rodriguez

Research Experience Institution: University of Puerto Rico Medical Science Campus

Research Mentors: Dr. Jennifer Barreto Estrada

Project Title: BDNF expression in the mesolimbic reward system in the extinction of morphine place preference

Project Abstract: Opioid addiction is the leading cause of overdose in the United States, leading to the deaths of over 100,000 in 2021 (CDC, 2021-22). Substance use disorder (SUD) is a cognitive disorder of chronic relapse in which an organism develops a dependency to a substance. Although it is not fully understood, studies suggest that aberrant learning patterns cause neuroplasticity changes in the circuits of the corticomesolimbic dopaminergic system, resulting in the lack of extinction of persistent drug-seeking. Previously, we showed that male rats that extinguished drug-seeking behavior after being subjected to morphine-induced conditioned placed preference (CPP) exhibited a higher transcript of brain-derived neurotrophic factor (BDNF) in the ventral striatum/nucleus accumbens (VS/NAc). Therefore, this research will 1) evaluate whether the bdnf transcript expression correlates with BDNF protein expression in the VS/NAc, 2) determine BDNF expression in the amygdala (AMY) and the hippocampus (HPC), 3) preliminarily, compare morphine conditioning and extinction between males and females, and 4) determine frequency of rears and side changes, as a measure of withdrawal symptoms and exploratory-based anxiety, respectively. In males, three distinctive behavioral phenotypes were observed: the sham-extinction group (rats that remain in their home cage; n=5), the extinction group (rats that extinguished CPP; n=12), and the extinction resistant (rats that did not extinguish CPP; n=7). Preliminary results showed similar conditioning patterns between male and female rats, however, thirteen (13) percent (2 out of 16) of female rats were able to extinguish their morphine CPP, as compared to fifty (50) percent (12 out of 24) in males. Rears and side-changes in males significantly decreased in animals that received extinction training, compared to sham-extinction animals. In females, there was a similar pattern in each test, however preliminary baseline data shows less rears and side changes in all groups. At the molecular level, BDNF expression was not affected in the VS/NAc, although it was significatively increased in the HPC of animals in the extinction group. In contrast, BDNF expression in AMY was increased in both extinction and extinction-resistant groups. In females, preliminary results showed increased BDNF expression in the HPC, similar to males. Overall, our data shows that although increased BNDF expression in the AMY might be responsible for contextual learning during extinction training, the increased BDNF expression in the HPC plays a key role in the successful extinction of opioids seeking behavior.
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Daniela Umana

Research Experience Institutions: Florida Atlantic University, Jupiter campus

Research Mentors: Dr. Erik Duboue

Project Title: A study of feeding behavior in Astyanax mexicanus: Insight into the eating habits of surface and cave-dwelling fish.

Project Abstract: Across the animal kingdom, the peripheral nervous system (PNS) and central nervous system (CNS) work together to regulate food intake. Despite advancements in morphological evolution, it remains unclear how naturally occurring polymorphism influences physiological changes and eating behaviors. To examine variation in eating behavior, we used an independently derived population of Astyanas mexicanus. Cavefish live in nutrient-poor environments, evolving survival mechanisms such as hyperphagia. As part of this study, consumption assays were conducted on adults and larvae six days after hatching. The researchers found that only one subpopulation of cavefish consumed more food than their surface counterparts as adults. In contrast, six days after hatching, Pachon and Tinaja larvae showed hyperphagia-like behavior. Moreover, cross-breeding F2 Pachon and Surface hybrid larvae is an effective method for studying variances in eating behavior. Significant results could suggest that the causal allele dominates surface populations, resulting in hybrids consuming less. In F2 Surface/Pachon hybrids, there was no correlation between physiological characteristics and hyperphagia behavior. In the preliminary study, we used tERK and pERK immunostaining to compare brain activity in the telencephalon region between fed and unfed Pachon larvae. It was observed that fed Pachons displayed a higher level of brain activity. The findings might indicate that some underlying mechanism regulates cavefish eating

behavior in the telencephalon area. In light of this, we hope to explain how natural polymorphism in the animal kingdom can cause drastic changes in eating habits and brain activity.

Manuel Vasconcelos

Research Experience Institution: Salk Institute for Biological Sciences

Research Mentors: Anousheh Bakhti-Suroosh, Dr. Romy Wichmann, Dr. Kay Tye

Project Title: The use of semi-supervised data analyzes to extract aligned motifs from neural activity and behavior

Project Abstract: To advance our understanding of how brain activity governs behavior, neuroscience has placed significant emphasis on the development of semi-supervised tools that align real time behavioral recordings with in-vivo electrophysiological data. Prior to semi-supervised methods of data analysis, manually scoring behavioral videos was the norm. However, manual scoring proved to be inefficient and susceptible to the biases stemming from inter-rater reliability. One of the latest and widely used pose estimation software is Social LEAP Estimates Animal Poses (SLEAP), which allows for the quantification of behavior by allowing users to track key points along the body of the subject. Employing machine learning techniques, SLEAP provides multi-animal pose estimation data that can be integrated into subsequent semi-supervised analysis pipelines. This data serves as the foundation for extracting relevant behavioral features, conducting dimensionality reduction, and applying clustering methods. In addition, Neuropixels probes enable recordings from 384 channels, facilitating the capture of large neuron populations while minimizing invasiveness and enhancing region specificity. The software, Phy, is used to visualize and manually curate the spikes recorded into distinct neurons. In conjunction, semi-supervised analyses such as SLEAP and Phy are indispensable in facilitating the alignment of neural activity with specific behavioral motifs, offering a comprehensive perspective on the neural circuits behind complex behaviors.

Marivelisse Velazquez

Research Experience Institution: Michigan State University

Research Mentors: Dr. Caryl E. Sortwell

Project Title: Impact of the BDNF rs6265 SNPon Nigrostriatal Innervation Density

Project Abstract: Motor dysfunction in Parkinson's disease (PD) is caused by degeneration of the nigrostriatal dopamine system resulting in depletion of dopamine in the striatum. Levodopa, the gold standard antiparkinsonian medication, replenishes presynaptic dopamine production. However, PD patient response to levodopa is heterogeneous and may be impacted by patient genotype. In previous studies we examined the impact of variant status of the rs6265 single nucleotide polymorphism (SNP) in the brain-derived neurotrophic factor (BDNF) gene on therapeutic response to levodopa in early-stage PD. The BDNF rs6265 met allele is associated with reduced release of BDNF, a protein with potent effects on neuronal health and functioning. We observed that rs6265 met allele PD subjects experienced a suboptimal response to levodopa compared to val/val subjects. The impact of the rs6265 met allele on nigrostriatal circuitry is unknown. We hypothesize that decreased release of BDNF, associated with the BDNF rs6265 met allele, decreases nigrostriatal innervation density and thus impacts efficacy of levodopa. To examine this, we analyzed dopaminergic innervation of the striatum of 14-month old wildtype (val/val, n=7) and met/met (n=7) rs6265 knock in rats. For our methodology, we used quantitative immunofluorescence for tyrosine hydroxylase and dopamine transporter. The outcome of this research will determine whether the rs6265 met allele impacts dopaminergic innervation of the striatum. Results will provide insight into the mechanism whereby levodopa treatment is suboptimal in rs6265 met allele subjects.

Ricardo Vera-Sánchez

Research Experience Institution: University of Puerto Rico, Río Piedras Campus

Research Mentors: Yamil D. Miranda-Negrón, José E. García-Arrarás

Project Title: Optimizing a qRT-PCR protocol for *H. glaberrima* radial nerve cords

Project Abstract: Echinoderms display some of the most impressive regenerative capabilities in the animal kingdom. The sea cucumber *Holothuria glaberrima* is an echinoderm considered a model system to understand cellular and molecular mechanisms of regeneration. Its high regeneration capacities extend to many tissues, including the central nervous system. The major nervous system components in echinoderms are the circumoral nerve ring (NR) and the radial nerve cords (RNC). By studying the nervous system of echinoderms during regeneration we can understand the evolution of the chordate nervous system and its potential regeneration capacities. Nerve system regeneration in *H. glaberrima* is studied by examining its RNC. These structures can completely regenerate 28 days post-transection. Currently, RNC studies in *H. glaberrima* are limited by the tools required to obtain RNA for molecular studies. Therefore, optimizing the qRT-PCR protocol for analyses of radial nerve cord tissues mRNA is essential for future molecular studies. Current limitations include a high amount of RNA that is required to produce cDNA, a minimum quantity of cDNA to perform PCR studies, and a large number of animals and materials to obtain enough RNA. Hence, in this study, two different qRT-PCR protocols were compared to optimize the ideal protocol for *H. glaberrima's* RNCs. The first aim of this project is to increase the cDNA synthesis yield of the qRT-PCR protocol. The experimental design consists of a comparison between two protocols that are utilized to synthesize cDNA. The kits tested were the Improm-IITM Reverse Transcription System and the iScript cDNA Synthesis Kit. A higher cDNA yield while using a lower amount of initial RNA is expected by utilizing the iScriptTM kit because it uses random and Oligo(dT) for its mRNA priming. Results of cDNA concentration using 1000ng, 500ng, and 250ng of initial RNA determined that an increase in the cDNA yield was obtained when using the iScript kit. To use fewer animals and to determine the minimum amount of RNC needed to produce enough cDNA for a qRT-PCR, another experiment was conducted using RNA extracted from 1, 2, 3, 4, 8, and 16 RNC. RNA concentrations were measured, and cDNA was produced. Results indicated that utilizing a single RNC to produce cDNA is not sufficient to obtain RNA concentrations for cDNA synthesis. The use of two RNCs demonstrated sufficient to produce enough cDNA for qPCR. It was observed that as the amount of RNC increased the concentration of RNA increased. Future directions will aim at determining cDNA quality with agarose gel electrophoresis and quantifying transcription of specific genes of interest involved in regeneration studies.

Bryanna Vilnaigre

Research Experience Institution: Brown University

Research Mentors: Hwamee Oh

Project Title: Differential effects of beta-amyloid deposition and diagnostic status for changes in hippocampal subfield volume across Alzheimer's disease continuum

Project Abstract: Alzheimer's disease (AD) is a neurodegenerative disorder characterized by amyloid-beta (Aβ) plaques and brain atrophy in medial temporal structures, like the hippocampus. The hippocampus consists of subfields that are differentially affected by aging and neurological disorders. Whether and how hippocampal subfields are differentially affected by Aβ levels remains elusive. In addition, it remains unknown whether such relationships differ with diagnostic status across the AD continuum. We evaluated 281 participants from the Alzheimer's Disease Neuroimaging Initiative (ADNI2) dataset. ADNI2 is a longitudinal study developed to examine differences among cognitively-normal (CN) older adults, patients with early and late mild cognitive impairment (EMCI, LMCI), and AD. High resolution images of the hippocampus were obtained using structural magnetic resonance imaging, and Aβ presence was detected using positron emission tomography scans. Subfield atrophy was greater with increased disease severity. Comparing AD to CN groups, there was a significant volumetric reduction in hippocampal subfields, such as CA1 and dentate gyrus (DG). LMCI groups were associated with significantly decreased CA1, CA2, and DG volumes. There were significant interactions between Aβ and EMCI diagnoses in the right entorhinal cortex (rERC) and DG volume. These results indicate specific relationships between hippocampal subfields and diagnostic status as a function of Aβ positivity. Future studies are warranted to explore factors linking EMCI diagnosis and Aβ positivity in volumetric reduction of the rERC and DG. This work could help identify individuals at earlier stages of AD, furthering our understanding of the disease pathology.

Glen Wickersham

Research Experience Institution: University of Puerto Rico, Río Piedras Campus

Research Mentors: Dr. Jose A Garcia Arraras

Project Title: Semi-quantitative analysis neurotrophic factors and their receptors in regenerating mesentery of the sea cucumber *H. glaberrima*

Project Abstract: The field of regenerative medicine and precision medicine aims to use growth factors, transcription factors, and other regulators to target specific cellular mechanisms to regenerate tissues and organs. In humans, the ability to regenerate their nervous system is highly limited by many issues that are not yet fully understood. In contrast, other animal species have amazing regenerative capacities. The sea cucumber *H. glaberrima*, like other echinoderms, has been shown to be a potential model to understand nervous system regeneration. One of the components we are exploring is the reinnervation of the regenerated intestinal tissue and possible nerve-dependent regeneration initiated by the blastema. We hypothesize that fibroblasts and mesenchymal cells inside the blastema are sending growth factors and motility factors to the neurons in the mesentery, thus modulating their behavior. Exploration of these putative factors identified from regeneration transcriptomes has allowed the identification of several holothurian orthologues of vertebrate genes. Two differentially spliced sequences were discovered for the growth factor neurotrophin-3 and two sequences were also found for the GDNF family related receptor 4. These were present in both radial nerve cord and intestine transcriptomes. GFRα-4 sequences contained the binding domains for the GFRα family as well as two hydrophobic regions at the end and beginning of the sequence. NT-3 sequences contained the binding domains for the NGF superfamily. Neighbor-joining trees demonstrated groupings of TrkC receptors, GFRα-4 and NT-3 among echinoderm sequences. Using differential gene expression sets generated from RNA-sequencing log-2-fold change analysis, the expression levels of the holothurian GFRα-4 and NT-3 genes were determined at different intestinal regeneration stages. Both were found to be underexpressed before 7 days post evisceration (dpe) and overexpressed at 14 dpe suggesting their association with intestinal reinnervation. Further studies of these genes could lead to the determination of their roles in regenerating tissue and their possible importance in the regeneration of the organs.

Linisa Williams

Research Experience Institution: University of California, San Diego

Research Mentors: Dr. Daniel Stout, Dr. Victoria Risbrough

Project Title: The Effects of Brief Working Memory Training on Electrophysiological Markers of Fear Extinction

Project Abstract: Anxiety disorders are highly prevalent and associated with substantial functional impairment. Dysregulation in fear extinction is a hallmark feature of anxiety-related disorders and is a crucial mechanism in exposure therapy. Successful extinction, the decrease in fear response to a stimulus that was previously threatening, depends on the retrieval of the new extinction memory and inhibition of the fear memory. Fear extinction relies, in part, on an individual's cognitive abilities to gate prior fear memories from driving cognitive and emotional behaviors. Recent research has reported that extinction learning is associated with working memory (WM) ability and WM Training (WMT) reduces fear ratings during a laboratory speech exposure session, raising the possibility that improving WM may also improve fear extinction learning. Thus, the aim of this investigation is to examine the effect of WMT on fear extinction. A sample of 39 adults completed a fear acquisition and fear extinction paradigm while electroencephalography (EEG) was recorded. Prior to fear extinction, participants were randomly assigned to adaptive WMT (n=19) or Sham Training (ST) (n=20). Analyses focused on the posterior late positive potential (LPP), an event-related potential sensitive to emotional arousal and affective processing. A Group (WMT vs ST) x CS Type (CS+ vs CS-) repeated measures analysis of variance was conducted on the average LPP during extinction. No significant main effects were observed (ps > .12), however the critical Group x CS Type interaction was significant, F(1,37) = 7.60, p = .009. Post-hoc analyses focused on the difference between CS+ and CS- trials as an index of excess fear during extinction (high scores = more fear). We found that participants in the WMT group had a significantly lower LPP than those in the ST, t (37) = 2.76, p =.009. This result remained significant after controlling for variance in age and sex (ps < .03). These preliminary findings

support: 1) WM as a key component of extinction learning, and 2) the potential of leveraging WMT to improve fear extinction learning. These results identify potential neurocognitive mechanisms that underlie fear extinction. Moreover, WMT may offer a possible adjunctive or stand-alone intervention to improve exposure therapy success rates in individuals with anxiety and fear-related disorders.

J Olivia Young

Research Experience Institution: University of California, San Diego

Research Mentors: Satish Jaiswal, Suzanna Purpura, Jyoti Mishra

Project Title: Nurturing Emotional Cognitive Control: The Impact of Breath-Focused Cooperative Compassion Training in Parent-Child Dyads

Project Abstract: Childhood mental illness impacts around 1 in 10 families, and often foreshadows a diminished quality of life that may persist into adulthood. Moreover, families with a mentally ill child frequently experience persistent stress, and existing pharmacological treatments often prove inaccessible or ineffective for sustained symptom resolution. Consequently, the present study sought to develop and assess the efficacy of a non-pharmacological, technological, accessible intervention tailored for children, particularly those exhibiting above-average depression scores. This intervention involved delivering a meditation and cooperative compassion training program that engaged both the child and their parent simultaneously through a mobile app. Neural and cognitive measures were recorded in 23 parent-child pairs both at baseline and post-intervention. Simultaneous electroencephalography (EEG) recordings were conducted on the parent-child dyads during cognitive assessments, which were delivered using an internally developed neuro-cognitive platform. Cognitive results revealed improved emotional cognitive control (i.e., the ability to perform cognitive tasks amidst emotional distractions) in both parents and children ($p < 0.05$). Furthermore, a significant reduction in depression and anxiety symptoms was specifically noted in parents ($p < 0.05$). Moving forward, our ongoing EEG analyses will delve into the neural foundations of the cognitive findings and explore co-neural synchrony between the brains of children and their parents.

GRADUATE FAIR PARTICIPANT LIST

BOOTH	INSTITUTION
1	BAYLOR COLLEGE OF MEDICINE
2	BRANDEIS UNIVERSITY
3	BROWN UNIVERSITY
4	CARNEGIE MELLON UNIVERSITY
5	DREXEL UNIVERSITY
6	EMORY UNIVERSITY
7	GEORGETOWN UNIVERSITY
8	HARVARD UNIVERSITY
9	JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE
10	MASSACHUSETTS INSTITUTE OF TECHNOLOGY
11	MICHIGAN STATE UNIVERSITY (MCIP)
12	MICHIGAN STATE UNIVERSITY
13	NATIONAL INSTITUTE OF NEUROLOGICAL DISORDERS AND STROKE
14	NORTHWESTERN UNIVERSITY
15	OREGON HEALTH & SCIENCE UNIVERSITY
16	THE PENNSYLVANIA STATE UNIVERSITY (CDNE)
17	THE PENNSYLVANIA STATE UNIVERSITY
18	PRINCETON UNIVERSITY
19	STANFORD UNIVERSITY
20	TEMPLE UNIVERSITY
21	UNIVERSITY OF CALIFORNIA BERKELEY
22	UNIVERSITY OF CALIFORNIA DAVIS
23	UNIVERSITY OF CALIFORNIA SAN DIEGO
24	UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS
25	UNIVERSITY OF IOWA
26	UNIVERSITY OF MARYLAND SCHOOL OF MEDICINE
27	UNIVERSITY OF MICHIGAN
28	UNIVERSITY OF PENNSYLVANIA
29	UNIVERSITY OF PITTSBURGH
30	UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT SAN ANTONIO
31	UNIVERSITY OF UTAH
32	UNIVERSITY OF WASHINGTON
33	VANDERBILT UNIVERSITY
34	WAKE FOREST UNIVERSITY SCHOOL OF MEDICINE
35	WASHINGTON UNIVERSITY IN ST. LOUIS
36	YALE UNIVERSITY

GRADUATE PROGRAM INFORMATION

BAYLOR COLLEGE OF MEDICINE

Neuroscience Graduate Program | https://www.bcm.edu/education/graduate-school-of-biomedical-sciences/programs/neuroscience

Program Description: Our program focuses on the nervous system from its most basic ion channels to its most advanced computations. The core curriculum is designed to provide you with a broad foundation in modern neuroscience, including current laboratory techniques, genetics, cell biology, developmental neuroscience, neurophysiology, neuroanatomy, systems and computational neuroscience and neurological disease.

Faculty research interests span a wide range of neuroscience fields from molecular and cellular neurobiology to circuits, systems and theoretical modeling. Student research interests are equally broad yet a sense of community characterizes interactions across the program. Students participate in cutting edge research starting in their first-year rotations and go on to have successful careers in academia, industry, teaching and law where their strong graduate training plays a key role.

Baylor is regularly ranked as one of the top institutions receiving neuroscience funding from the National Institutes of Health. Our work is supported by state-of-the-art research facilities for molecular neurobiology, neurophysiology, microscopy and functional human brain imaging, in addition to college-wide core laboratories offering the latest instrumentation for experimental work.

For more information, email Wanda Kubeczka, Program Administrator (wandaw@bcm.edu)

Application deadline: Applications received by Dec. 1 will be considered for early review and are strongly encouraged. Jan. 1 is the final application deadline. Late applications will be considered on a space-available basis.

Application fee waivers: It is free to apply! In addition, we offer a competitive stipend, currently $37,500 without any teaching requirements, provide medical insurance at no cost to the student and our students receive tuition waivers.

BRANDEIS UNIVERSITY

Neuroscience PhD Program | https://www.brandeis.edu/neuroscience/

Program Description: The human brain has roughly as many neurons as there are stars in our galaxy, making it an enormously complex adaptive system. Making sense of this complexity increasingly requires neuroscientists who are both broadly trained critical and creative thinkers, and who have extensive analytic and computational skills. The Interdepartmental Neuroscience graduate program at Brandeis comprises a comprehensive training program designed to give the next generation of outstanding neuroscientists the cognitive and technical skills they need to make important breakthroughs in understanding nervous system function and health. Our program is characterized by a diverse and highly collaborative set of internationally renowned faculty, with research programs that incorporate all the major subdisciplines of the field. Collaboration is part of the air we breathe: being a vibrant program embedded in a small and intimate research university naturally encourages interactions across model systems and at the interfaces between disciplines. During laboratory rotations students are encouraged to explore intellectual frameworks and acquire a range of skills, and throughout their PhD will interact with and receive mentoring from a diverse group of faculty, as well as near-peer mentoring from a strong cohort of interdisciplinary graduate students and postdocs. Our trainees are highly successful in a range of pursuits after graduation, including academic and industrial science, science policy, and science communication.

For more information, email Jane Theriault (jtheriault@brandeis.edu) or the Neuroscience Program (neuroscience@brandeis.edu).

Application deadline: December 1, 2023

Application fee waivers: Participants in ENDURE can use "SFN2024" for an application fee waiver.

BROWN UNIVERSITY

Neuroscience Graduate Programs | https://www.brown.edu/academics/neuroscience/graduate/

Program Description: Our Neuroscience Graduate Program strives to provide individualized, high-quality training to predoctoral students. Providing a diverse and inclusive environment are central to our goals. Students receive broad, multi-disciplinary training in neuroscience, spanning many levels of inquiry, from genes through cognition and computation. We emphasize concepts, methodologies, quantitative skills, and sophisticated analysis of the primary literature. Our curriculum includes core courses, seminars, and workshops for developing skills that are essential for successful, independent research careers in neuroscience. We foster an environment unconstrained by traditional discipline boundaries.

For more information, email nsgp@brown.edu.

Application deadline: December 1, 2023

Application fee waivers: Fee waivers are available for U.S. citizens or permanent residents applying to NSGP who are members of SACNAS, MARC, BP-ENDURE, Leadership Alliance, RISE programs or similar programs; under-represented groups or can demonstrate financial need.

CARNEGIE MELLON UNIVERSITY

Neuroscience Institute Programs | https://www.cmu.edu/ni/academics/psn/index.html

Program Description:

1. The Program in Systems Neuroscience (PSN) The Program in Systems Neuroscience (PSN) trains students with backgrounds in biology and neuroscience disciplines in the growing field of quantitative systems neuroscience and also provides them the essential background in experimental neuroscience. The PSN is administered by the Neuroscience Institute, and benefits from a close relationship with the Center for the Neural Basis of Cognition (CNBC), an integrative center spanning both CMU and the University of Pittsburgh. All PSN students are by extension members of the CNBC.

2. The Program in Neural Computation (PNC) trains students with strong quantitative backgrounds in quantitative disciplines relevant to neuroscience and also to provide them the essential background in experimental neuroscience.

3. Program in Biomedical Sciences

For more information, email: Melissa Stupka, mstupka@cnbc.cmu.edu.

Application deadline: December 1, 2023

Application fee waivers: No fee to apply.

DREXEL UNIVERSITY COLLEGE OF MEDICINE

Graduate Program in Neuroscience | https://drexel.edu/medicine/academics/graduate-school/neuroscience/

Program Description: The Graduate Program in Neuroscience (NEUS) at Drexel University College of Medicine embraces the interdisciplinary nature of neuroscience. By incorporating expertise across departments and areas of research, the program offers a broad exposure to cellular, molecular, behavioral, developmental and systems neuroscience, with a strong emphasis on disease, injury and therapeutics. Students engage in rigorous research

training using multidisciplinary approaches and cutting-edge technology. Their educational experience is not limited to the bench - they benefit from extensive interactions with the faculty, participation in scientific meetings and training in the panoply of skills (writing, teaching, formulation of hypotheses, experimental design) required for independence and success in a variety of career possibilities. Students in the program can earn an MS or PhD degree, leading to careers in academic research, teaching, pharmaceutical research, industry, government, academic administration, public policy and beyond.

For more information, email rr79@drexel.edu.

Application deadlines: Dec 15 for PhD; rolling until July 15 for MS

Application fee waivers: Waivers are granted on a case-by-case basis. Applicants are encouraged to contact the program director.

EMORY UNIVERSITY

Graduate Program in Neurosciences | http://www.biomed.emory.edu/PROGRAM_SITES/NS/

Program Description: The Graduate Program in Neuroscience at Emory University provides a broad interdisciplinary training in a wide spectrum of neurobiological issues spanning several basic and clinical neuroscience-related disciplines. Over 100 PhD students including 25% from under-represented minority groups, are currently enrolled in the Emory Graduate Neuroscience program. As a community, we recognize that students from underrepresented groups in the university bring new perspectives that enrich the program and enhance the educational experience of all students. Over 90% of trainees who completed their PhD during the past ten years have successfully developed research-related careers. The attrition rate of the program has been below 10% for the past ten years. A total of 130 faculty spread across 22 university departments and centers are members of the Emory Graduate Neuroscience Program, which provides a broad range of training opportunities in various fields of neuroscience. Students in the program receive a broad curriculum of molecular, cellular and systems neuroscience courses in their first two years. A required hypothesis design and grant writing course helps students prepare their thesis proposal (with oral defense) in the form of a National Research Service Award (NRSA) predoctoral fellowship application. The Emory Neuroscience Program is currently ranked 4th in the nation for the total number of NRSAs. Training in quantitative literacy, scientific rigor and reproducibility has been integrated in these core courses. Trainees are also required to participate in 3 laboratory rotations before they pick their advisor (usually at the beginning of year 2). A wide variety of elective courses ranging from Basic Mechanisms of Neurological Diseases, Brain imaging, Computational Neuroscience and Neuropharmacology are available to advanced trainees. Finally, students actively participate in various seminar series and receive significant training in teaching, neuroethics and scholar integrity.

Application deadline: December 1, 2023

Application fee waivers: Yes, application fee waivers are given to URM students upon request.

GEORGETOWN UNIVERSITY

Interdisciplinary Program in Neuroscience | https://neuroscience.georgetown.edu/

Program Description: A PhD program designed to support, encourage, and stretch our students to a deeper understanding of the field of neuroscience so they are able to contribute new knowledge and original research. Through continued academic and professional formation, our students are part of the constant ongoing evolution of neuroscience.

Application deadline: December 1, 2023

Application fee waivers: Please check out the detailed information here: https://biomedicalprograms.georgetown.edu/prospective/faq/?_ga=2.263678607.2086835678.1690978167-2121471978.1687523574#applicationfee

HARVARD MEDICAL SCHOOL

Program in Neuroscience (PiN) | https://pinphd.hms.harvard.edu/

Program Description: The Harvard PhD Program in Neuroscience (PiN) is centered in the Harvard Medical School Department of Neurobiology, founded in 1966 as the first research department in the world to take an interdisciplinary systemic approach to studying the brain as an organ, and spans the neuroscience community across the University. The program provides mentoring and advising to a close and supportive community of students who carry out PhD research in laboratories on the Harvard Medical School Quadrangle (the Quad), in Harvard-affiliated hospitals, and at Harvard's Center for Brain Science under the Faculty of Arts & Sciences in Cambridge. PiN students come from a wide range of scientific, personal, and cultural backgrounds. More than 150 faculty members provide exciting and rigorous research training in all areas of neuroscience to our 120+ students, preparing them for careers across many sectors from academic research to science policy, biotech, pharmaceuticals, consulting, K-12 and community education, science writing and outreach, "big data," and other developing fields. We are dedicated to educating students so they develop as neuroscientists who will change science in the 21st century and beyond.

For more information about Harvard PiN, the application process, and recruitment events for 2023, visit https://tinyurl.com/yda5mj9j.

Application deadline: December 1, 2023

Application fee waivers: Waiver requests are built into the online application.

ICAHN SCHOOL OF MEDICINE AT MOUNT SINAI

Neuroscience PhD program | https://icahn.mssm.edu/education/phd/neuroscience

Program Description: Our program provides multidisciplinary and highly collaborative research training in basic, translational and clinical neuroscience. Ranked 4th nationally in NIH funding, the Neuroscience department and Graduate program leverage partnerships among the School of Medicine, the Mount Sinai Hospital and Health System, and other Institutions to provide extraordinary diversity of scientific and clinical strengths and includes a course with direct patient contact. Trainees study a variety of model organisms, including humans, and benefit from science theme-based Clubs, seminars, career development opportunities, teaching and peer-mentoring activities, an annual retreat and other events.

Application deadline: December 1, 2023

Application fee waivers: Yes, upon approval from the Graduate School.

JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE

Neuroscience Graduate Program | http://neuroscience.jhu.edu/graduate

Program Description: Participation in extensive collaborations, access to cutting-edge resources, and exposure to world-class research, await students in our program. The Neuroscience Training Program and the Neuroscience Department were among the first neuroscience-focused academic centers established in the United States, dating back to 1980. Our faculty have trained over 250 PhD and MD/PhD students and 500 postdoctoral fellows in just the past ten years, partnerships that have led to fundamental discoveries in the organization of the cerebral cortex, neurotransmitter signaling, neuronal and glial cell development, and circuit function.

Our students represent the brightest young scientific minds, and many have shown an early commitment to research. Because they enter our Program with different backgrounds, and the laboratories in which they choose to work are so diverse, our program is designed to be flexible. All doctoral candidates receive full tuition remission and a stipend for the duration of their studies. Currently, 177 doctoral candidates and 200 postdoctoral fellows work in the faculty laboratories, creating a diverse community that fosters development of novel approaches to answer complex questions.

The goal of the Program to ensure that our students obtain broad training in the neurosciences. Our curriculum spans the breadth of modern neuroscience, from molecular/cellular underpinnings to systems/cognitive integration, and offers a rich training experience that brings students to the forefront of research in their particular area of interest, in preparation for a rewarding, independent career in the sciences. Core courses cover the basics of molecular and cellular neuroscience, neuroanatomy, and systems neuroscience. Electives and laboratory rotations provide students with specialized training, and the Department's long-standing seminar series brings in weekly national and international luminaries, exposing students and fellows to the full spectrum of the world's most exciting new discoveries in neuroscience.

Our 34 primary faculty, together with over 80 other faculty who have secondary appointments in the Department, offer graduate students and postdoctoral fellows an incomparable neuroscience training experience. Our students also have the opportunity perform laboratory rotations and conduct thesis research in the laboratory of scientists at Janelia Research Campus of the Howard Hughes Medical Institute, located near Leesburg Virginia. Faculty in the many departments associated with the Program share a commitment to training the next generation of scientists.
In recognition of this outstanding environment, our graduate program is consistently ranked among the best in the country, and our graduates have gone on to faculty positions at other leading institutions and senior research positions in pharmaceutical and biotech companies.
There has never been a more exciting time in the field of neuroscience. We hope you will join us in this journey of discovery.

Application deadline: December 1, 2023

Application fee waivers: Liberal application fee waiver policy – please see website for details.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Brain and Cognitive Sciences | https://bcs.mit.edu/academic-program

Program Description: The Department of Brain and Cognitive Sciences offers programs of study leading to the doctoral degree in neuroscience or cognitive science. Areas of research specialization include cellular and molecular neuroscience, systems neuroscience, computation, and cognitive science. The graduate programs are designed to prepare students to pursue careers in research, teaching, or industry.

The PhD program is normally completed in approximately six years of full-time work, including summers. Formal coursework for the departmental program consists of six classes intended to prepare the student to pass the general examinations and do original thesis research.

Graduate students begin a research apprenticeship immediately upon arrival with lab rotations in the first year. To familiarize new students with the research being conducted in the department, the department hosts a series of talks in September by faculty whose labs are open for rotations. Laboratory rotations allow students to get to know several different labs; learn concepts and techniques, and select a laboratory in which they will complete their dissertation research.

At the end of the first year, an advisory committee of two to four faculty members is formed. This committee monitors progress and, with membership changing as necessary, evolves into the thesis committee. Thesis research normally requires 24-48 months of full-time activity after the qualifying examinations have been passed. It is expected that the research embodied in the PhD dissertation be original and significant work, publishable in scientific journals.

Upon successful completion of all program requirements, the student will be awarded the PhD in the corresponding field of brain and cognitive sciences.

NIH-funded Computationally-Enabled Integrative Neuroscience (CEIN) program for doctoral students reflects our commitment to train future leaders in neuroscience in multiple experimental methods and concepts of neuroscience ("integrative neuroscience"), and in the use of computation at multiple levels of analysis including experimental design, data analysis, computational modeling, and theorizing. With comprehensive training in

integrative neuroscience and computation trainees will be well prepared to make fundamental discoveries about the brain and to advance our understanding of neurological and psychiatric disorders.
Financial assistance is provided to qualified applicants in the form of traineeships, research assistantships, teaching assistantships, and a limited number of fellowships, subject to availability of funds. Prospective students are encouraged to apply for individual fellowships such as those sponsored by the National Science Foundation and the National Defense Science and Engineering Graduate Fellowship Program to cover all or part of the cost of their education.

Application deadline: December 1, 2023

Application fee waivers: Fee waivers are available to all attendees upon request by emailing jugale@mit.edu.

MICHIGAN STATE UNIVERSITY

Neuroscience Graduate Program | https://neuroscience.natsci.msu.edu/prospective-phd/become-a-spartan.aspx

Program Description: The MSU Neuroscience Graduate Program was founded in 1998 and offers training in all aspects of neuroscience. Our extensive curriculum, taught by faculty who are leading researchers in their fields, emphasizes critical thinking and the latest techniques and discoveries. Our classes cover molecular, cellular, and systems neuroscience and include training in biostatistics, programming, and research techniques. With more than 70 faculty members in 18 departments, we feature research strengths in neurodegenerative diseases, motivated behaviors, neuroimaging, the gut-brain axis, and neuroimmunology, among many others, and we have a strong history of training successful students in all of these fields. Our students are fully supported through a year of laboratory rotations and coursework before choosing a mentor and embarking on the exciting journey of thesis research that leads them to world-class postdoctoral opportunities in academia, industry, scientific writing, teaching, policy, and more!

Application Deadline: December 5, 2023

Application fee waivers: Fee Waivers are Offered. See information here: https://grad.msu.edu/application-fee-waiver

Prospective applicants are also encouraged to reach out the Program Director, Dr. AJ Robison, in advance to discuss the fee waiver process.

MICHIGAN STATE UNIVERSITY

Molecular, Cellular, and Integrative Physiology Graduate Program (MCIP) | https://physiology.natsci.msu.edu/academics/graduate/molecular-cellular-and-integrative-physiology-ph-d-program/index.aspx

Program Description: The Molecular, Cellular and Integrative Physiology (MCIP) graduate program at Michigan State University provides individualized, cross-cutting training in the basic and applied physiological underpinnings of diseases with the goal of identifying treatment and prevention strategies. Students develop their scientific interests and learn best practices for experimental design, data analyses, and quantitative methodologies with highly-motivated, broadly-trained, multi-disciplinary groups of renowned faculty associated with the College of Natural Science, the College of Osteopathic Medicine, the College of Human Medicine and the premier veterinary school in the Midwest. Areas of particular strength include neurobiology, cancer biology, cardiac pathophysiology, diabetes, gastrointestinal physiology, immunity, obesity, inflammation, and the intersection of these specialties. Students receive additional training in the conduct of responsible research, scientific communication, teaching, opportunities to participate in community outreach programs, and are eligible for MCIP program-specific travel and research awards. The MCIP program offers the option of obtaining a master's and/or doctoral degree or combining program study with other degrees such as MD/PhD and DO/PhD Our PhD students are provided full support (stipend, tuition assistance and health benefits) over their first nine months in the program as they engage in three lab rotations. Afterwards financial support is covered by the dissertation advisor or by teaching assistantships (TA), fellowships, or training grants. In addition to world-class research opportunities, MSU offers

excellent work-life balance for students, enhanced by Michigan's wealth of four-season activities.

Learn more at https://physiology.natsci.msu.edu/academics/graduate/

Application Deadline: December 1, 2023. Prospective students apply via the interdisciplinary BioMolecular Science Gateway, which offers admission to six graduate programs: the Molecular, Cellular, and Integrative Physiology Program (MCIP), Biochemistry and Molecular Biology, Cell and Molecular Biology, Genetics and Genome Sciences, Microbiology and Molecular Genetics, and Pharmacology and Toxicology. Learn more and apply at https://biomolecular.natsci.msu.edu/

Application fee waivers: Application Fee Waivers are Offered to eligible students: see information at https://grad.msu.edu/application-fee-waiver

Prospective applicants are also encouraged to reach out in advance to the Program Director, Dr. Gina Leinninger, to discuss the fee waiver process.

NATIONAL INSTITUTE OF NEUROLOGICAL DISORDERS AND STROKE

Office of Research Training and Career Development | https://research.ninds.nih.gov/employment-training/training-programs-ninds/graduate-student-programs

Program Description: Our graduate programs are designed to support PhD students for a period of their research training in laboratories at the NIH Bethesda campus. Successful candidates will have an opportunity to conduct their doctoral thesis research in an NINDS intramural laboratory under the guidance and direction of an investigator who will serve as the trainee's mentor. The many graduate programs at NIH are available to students who are enrolled in doctoral programs in the biomedical sciences in accredited U.S. universities. The NINDS research experience is an integral part of the graduate student's academic progress and will involve a close partnership between NIH and the candidate's academic institution. All NINDS predoctoral fellows are participants of the NIH Graduate Partnership Program. Participants enjoy the academic environment of a university, the extensive research resources of the NIH, and the breadth and depth of the research programs of both the host university and the NIH Intramural Research Program. The goal is to create a different kind of graduate experience, one that focuses on training the next generation of scientific leaders by emphasizing communication and collaboration skills, integration of information, and interdisciplinary investigation. Graduate students come to the NIH in one of two ways: Institutional Partnerships - the pathway for students wishing to enroll in a PhD program and Individual Partnership - the pathway for students already enrolled in a PhD program, and there are two graduate programs in the neurosciences at NIH: University College London-NIMH Joint Doctoral Training Program in Neuroscience and Brown University-NIH Program.

For more information, email dirtraining@ninds.nih.gov

GRE: The GRE is not required.

Application deadline: December 1, 2023 for NIH institutional partnership; Rolling deadlines for NIH individual partnerships

Application fee waivers: N/A.

NORTHWESTERN UNIVERSITY

Northwestern Interdepartmental Neuroscience Program (NUIN) | https://www.nuin.northwestern.edu/index.html

Program Description: Northwestern University offers world-class advanced training in neuroscience via its Interdepartmental Neuroscience (NUIN) PhD program. NUIN is anchored in the Feinberg School of Medicine, Shirley Ryan Ability Lab and Ann & Robert H. Lurie Children's Hospital of Chicago on the university's Chicago campus and the Weinberg College of Arts and Sciences, McCormick School of Engineering and School of Communication on its Evanston campus. NUIN is a highly interdisciplinary and collaborative program with numerous and diverse foci of research excellence.

Application deadline: December 1, 2023 at 11:59 pm

Application fee waivers: Fee waivers for the NUIN application are provided by The Graduate School (TGS) at Northwestern. Additional information can be found here: https://www.tgs.northwestern.edu/admission/application-procedures/application-requirements/fee.html.

OREGON HEALTH & SCIENCE UNIVERSITY

Neuroscience Graduate Program | https://www.ohsu.edu/school-of-medicine/neuroscience-graduate-program

Program Description: Founded in 1992, the Neuroscience Graduate Program (NGP) at OHSU has 61 predoctoral students and more than 140 faculty in a broad range of subdisciplines. The program provides a strong foundation for students planning a career in academic or industry research, but we encourage students to explore the career path that matches their ambitions and expertise. The program is particularly strong in cellular neuroscience, biophysics of channels and transporters, glial
biology, sensory systems, developmental neuroscience, and disease-oriented neuroscience
research. Faculty members are located within research institutes at OHSU including the Vollum
Institute, Oregon Hearing Research Center, Jungers Center, the Oregon National Primate Research
Center (ONPRC), and the Oregon Institute for Occupational Health Sciences, as well as the basic and clinical departments in the OHSU School of Medicine.
Our admissions committee reaffirms its commitment to a holistic application review process. Our goal remains to form an NGP cohort from a diversity of perspectives, backgrounds, and experiences that enrich the graduate educational experience.

For more information on our philosophies related to equity and inclusion, please see: https://www.ohsu.edu/school-of-medicine/neuroscience-graduate-program/racial-equity-statement.

Application deadline: December 1, 2023

Application fee waivers: Application fees can be waived upon request and are available for attendees of ABRCMS, SACNAS, and summer programs

THE PENNSYLVANIA STATE UNIVERSITY

Cross Disciplinary Neural Engineering (CDNE) Training Program | https://www.cne.psu.edu/graduate-education/cdne-training-program.aspx#:~:text=Through%20the%20program%2C%20graduate%20students,the%20needs%20of%20their%20collaborators.

Program Description: At the Penn State Center for Neural Engineering, we invite bright and ambitious graduate students to join the Cross Disciplinary Neural Engineering (CDNE) training program funded by the National Institutes of Health (NIH). Second-year graduate students associated with the center should apply to the program to participate in their third and fourth years. Through the program, graduate students will learn to work across the disciplinary boundaries of engineering, sciences, mathematics, and human brain health, with the ability to communicate and understand deeply the needs of their collaborators. Ultimately, students who participate in the program will have the opportunity to produce lasting advances in both basic neurosciences and human brain health. Current graduate programs at PSU contributing to the CDNE training program include Biomedical Engineering, Electrical Engineering, Engineering Science and Mechanics, Mathematics, Mechanical Engineering, Physics, and Neuroscience.

Application deadline: December 15, 2023

THE PENNSYLVANIA STATE UNIVERSITY

Intercollegiate Graduate Degree Program in Neuroscience at University Park | https://www.huck.psu.edu/graduate-programs/neuroscience

Program Description: The Neuroscience (NERV) Graduate Program at University Park is an Intercollege Graduate Degree Program affiliated with the Huck Institutes of the Life Sciences, the Eberly College of Science, and the College of Engineering. The program provides interdisciplinary pedagogical and research training in the field of neuroscience that spans from molecules to organisms and includes both animal and human models. Students receive training in research and communications skills and rotate in multiple laboratories to enable success in biomedical research and other related professional fields. The Neuroscience Graduate Program engages faculty from the Colleges of Agriculture, Engineering, Health and Human Development, Information Sciences and Technology, Liberal Arts, and Science. Students gain a broad understanding of Neuroscience as well as specific expertise in their focused area of research.

Application deadline: December 15, 2023

Application Fee Waiver: Contact the program chair: Sonia Cavigelli (sac34@psu.edu)

PRINCETON UNIVERSITY

Princeton Neuroscience Institute | https://pni.princeton.edu/graduate-program/ph.d.-neuroscience

Program Description: How do millions of individual neurons work together to give rise to behavior at the level of a whole organism? How do our brains work?
Training researchers to answer these fundamental, unanswered questions is the goal of the Princeton Neuroscience Institute graduate program. Students in this program learn to use the latest techniques and approaches in neuroscience and are trained how to think and how to develop new techniques and approaches. Creativity and originality in research are essential to cracking the puzzle of the brain. PhD neuroscience students take lecture and laboratory courses; learn to read, understand, and present current scientific literature; develop and carry out substantial original research, and present their research at meetings and conferences, including the annual Neuroscience retreat each spring.

For more information, email Dr. Gabby Xu our director of training at gabby.happy@princeton.edu

Application deadline: November 21, 2023 (Tentative)

Application fee waivers: Visit https://gradschool.princeton.edu/admission-onboarding/prepare/deadlines-and-fees

STANFORD UNIVERSITY

Neurosciences Interdepartmental Graduate Program | https://med.stanford.edu/neurogradprogram.html

Program Description: The Stanford Neurosciences Interdepartmental Program (IDP) offers interdisciplinary training leading to a PhD in Neuroscience. The primary goal of the program is to train students to become leaders in neuroscience research, education and outreach. Graduates of the program will be innovators, investigators, and teachers whose programs and pursuits are founded on research. The signature feature of the Stanford Neurosciences IDP is the combination of outstanding faculty researchers and exceedingly bright, energetic students in a community that shares a firm and longstanding commitment to understanding the nervous system at all its levels of function.

GRE: The GRE is not considered.

Application deadline: December 5, 2023, at 11:59:59 pm (PST)

Application fee waivers: Applicants who need assistance with the application fee are encouraged to apply for a fee waiver. Preference is given to low-income, first-generation, and underrepresented minority students who are U.S. citizens or permanent residents. Applicants who are part of a group that the NIH considers to be in need of a special recruitment and retention plan to diversify the biomedical sciences workforce are invited to apply, as well as any additional applicants for whom the application fee would be a substantial burden. Applying to more than one fee waiver option will not increase your opportunity of receiving a fee waiver.

International applicants to the 14 Biosciences PhD programs who need assistance with the application fee are eligible to apply for the School-Based fee waiver.

For a complete list of fee waiver options and eligibility requirements, please visit the Graduate Admissions website (https://gradadmissions.stanford.edu/apply/application-fee).

Please note that fee waiver requests are required to be submitted 10 business days prior to the application deadline (Tuesday, December 5 at 11:59:59 pm PST); so please plan accordingly.

TEMPLE UNIVERSITY

Department of Psychology & Neuroscience PhD program; Biomedical Sciences PhD program | https://liberalarts.temple.edu/academics/departments-and-programs/psychology/graduate/phd-program

Program Description: Temple scientists are at the forefront of research and teaching in the rapidly expanding world of neuroscience. We support an interdisciplinary approach to this exciting field of study, with our neuroscience programs spanning multiple Schools, Colleges, and research centers. The College of Liberal Arts Neuroscience Program offers psychology & neuroscience PhD and MS programs with research labs studying both cognitive neuroscience using human neuroimaging and behavioral neuroscience using animal models. Our students study neural basis of addiction, ADHD, age-related disorders, anxiety, depression, developmental disorders, memory, spatial learning and much more. The Neuroscience Cluster at the Lewis Katz School of Medicine is an educational working group, supporting PhD, MD/PhD, and MS educational/research programs within Lewis Katz School of Medicine at Temple University's Biomedical Sciences Graduate Program. This cluster provides thematic courses, research opportunities, and educational activities related to neuroscience, bringing together faculty members from basic science and clinical departments, as well as research centers—Center for Substance Abuse Research, Shriners Hospitals Pediatric Research Center, and the Alzheimer's Center at Temple. The Neuroscience Cluster offers graduate students exposure to a number of areas of basic neuroscience research and education with the goal of translating basic research advances into treatments for neurological and neuropsychiatric disorders. Indeed, the breadth and depth of the faculty members encourages an interdisciplinary approach to neuroscience education and research.

Application deadline: December 1, 2023

UNIVERSITY OF CALIFORNIA, BERKELEY

Helen Wills Neuroscience PhD Program | https://neuroscience.berkeley.edu/

Program Description: The Berkeley Neuroscience PhD Program offers intensive, integrated training in multiple areas of neuroscience research. The program includes 65 faculty members from many different campus departments, with expertise ranging from molecular and cellular neuroscience to systems and computational neuroscience to human cognitive neuroscience. Our community is proud of our creative graduate student and postdoctoral researchers, faculty and staff, and cutting-edge research and technology centers. Together, we harness Berkeley's world-class strengths to probe brain function, development, aging, and disease through new experimental, analytical, and theoretical approaches. Our Neuroscience PhD program provides an interdisciplinary training environment of coursework, research training, professional development, and mentoring, within a strong research program that produces fundamental advances in knowledge and novel techniques. Our program has 67 students. Graduates of the Neuroscience PhD Program have been extremely successful in both academia and industry. Our >150 alumni hold academic faculty positions (about 25%), postdoctoral research positions (about 25%), and positions in industry, including neuroscience, biotechnology, and Silicon Valley companies (about 40%). We provide extensive professional training as part of the PhD program. We strive to provide an inclusive and supportive training community for students with a wide variety of backgrounds.

Application deadline: November 30, 2023

Application fee waivers: Fee waivers available for applicants from various programs including BP-ENDURE program; ABRCMS; AISES; Ciencia Puerto Rico; Meyerhoff Program; PREP; RISE; MARC, and more.

UNIVERSITY OF CALIFORNIA, DAVIS

T32 Training Program in Basic Neuroscience | https://neuroscience.ucdavis.edu/training-program-basic-neuroscience

Program Description: The annual Neuroscience Initiative to Enhance Diversity (NIED) program aims to encourage sophomore, junior and senior undergraduate students to pursue a PhD in Neuroscience. https://grad.neuroscience.ucdavis.edu/NIED

Application deadline: January 31, 2023

Application fee waivers: For participants who have attended NIED, we are able to waive fees should they apply to the UC Davis Neuroscience Graduate Program.

UNIVERSITY OF CALIFORNIA, SAN DIEGO

Neurosciences Graduate Program | https://neurograd.ucsd.edu/

Program Description: The Neurosciences Graduate Program is an interdisciplinary program that provides course work and research training leading to a degree of Doctor of Philosophy in all areas related to the development and function of the nervous system. During the first two years, all students in the program are required to take seven core courses, take at least one ethics course, fulfill elective requirements, attend research rounds for two years, complete three research rotations the first year, and serve as a teaching assistant for at least one quarter. Additional course work is required for the students in the Computational Neuroscience Specialization (see below). Students must advance to candidacy by the end of their fourth year and complete their dissertation by the end of their sixth year.

Application deadline: December 1, 2023

Application fee waivers: U.S. citizens, Permanent Residents, and Undocumented students may be eligible for a waiver of the application fee. Applicants applying to multiple programs will be eligible for one fee waiver. All subsequent applications will need to be paid for. International applicants are not eligible for a waiver of the application fee.

Applicants may qualify for a Fee Waiver upon verification of one of the following:

Need-Based Federal Aid - FAFSA report, Financial Aid Award Letter, or document posting Federal need-based aid. Financial Hardship - Most recent state or federal tax forms, exhibiting the number of dependents and the adjusted gross income or Federal 1040 forms. See the “Income Eligibility Guidelines” link for more information.

U.S. Military Service - Copy of DD 214 (Air Force, Army, Coast Guard, Marines, Navy). If active duty, you will be asked to identify your branch of service in the application.

Graduate Prep Program Participation - UC San Diego provides a fee waiver for applicants who have participated in specific graduate programs. Note: Not all graduate preparation programs are eligible for the fee waiver. On the “Additional Information” or “Other” page of the online application select the program in which you participated. The name and business email address of the program director are required for the UCSD Graduate Admissions staff to verify your participation. If this verification cannot be completed, you will be asked to provide additional information or pay the application fee.

Please note all fee waiver requests must be submitted at least one week prior to the application deadline. Your application must be fully submitted for your fee waiver to be processed.

UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

Neuroscience Program | https://www.cuanschutz.edu/graduate-programs/neuroscience

Program Description: Welcome to the Neuroscience Graduate Program (NSP) at the University of Colorado, Anschutz Medical Campus. Through rigorous training and mentoring the program aims at graduating

neuroscientists who are critical thinkers and poised for success in any endeavor of their choosing. Below are some of the features of the program:

- A world-class research environment from an extremely collaborative group of faculty. A large fraction of our faculty members have joint grants. Often these collaborations are initiated by students.
- A convivial and close-knit group of students who are actively involved in all aspects of program governance.
- More than half of NSP students are successful in obtaining individual fellowships from NIH or NSF.
- Rigorous coursework spanning cellular, systems, developmental, and quantitative neuroscience. Students also take a grant writing course, biostatistics, and a number of electives in neuroscience.
- A robust seminar series.
- A student-run journal club held in the presence of senior authors of the papers being discussed.
- A fun annual Program Retreat in the Colorado Rocky Mountains.
- A creative and vibrant outreach program. NSP students collaborate with local schools, colleges, and the Denver Museum of Nature and Science. Our students write blogs for the Museum. In general, we have fun with Neuroscience.
- Student-led summer research training program for under-represented students from local colleges.

For more information, email jared.vazquez@cuanschutz.edu.

Application deadline: December 1, 2023

Application fee waivers: After the Graduate Recruitment and Networking Fair, you will receive an email message from CU Anschutz where you can acknowledge the waiver. Or you can contact Program Administrator Jared Vazquez, jared.vazquez@cuanschutz.edu.

UNIVERSITY OF IOWA

Neuroscience Graduate Program | https://neuroscience.grad.uiowa.edu/

Program Description: With a neuroscience degree from the University of Iowa your venues for the future are wide open. Whether you decide to go into academia, a research institute, or industry, the background you will receive from our program will have you fully prepared. Most of our PhD students pursue a post-doctoral training position after the completion of their studies with us. Afterwards, our graduates pursue careers that often place them in academia. Whatever you decide, when your time with us nears an end, you will find yourself in the center of a large number of options.

We place a lot of attention into helping you become an independent, successful scientist. We try to accomplish this by offering a large number of courses in our curriculum ranging from cellular and molecular biology into cognitive neuroscience, to help you obtain a very wide background. Our faculty is always very close to our students to help them with most any issue they have. Furthermore, to help you advertise your research as well as make as many contacts as possible with other scientists, we assist you with funds to attend a wide range of conferences. Our student body is always strongly organized, and we are always open to suggestions for improving our program so that you can get the most out of it. Our philosophy is that a program can be only as good as the students it prepares. Therefore, we will give you all possible options so that your journey with us can make the best out of you.

Application deadline: December 1, 2023 for best consideration with a January 1st deadline

Application fee waivers: Applicants who apply and receive interviews get their application fees reimbursed.

UNIVERSITY OF MARYLAND SCHOOL OF MEDICINE

Graduate Program in Life Sciences, Program in Neuroscience | http://lifesciences.umaryland.edu/Neuroscience/

Program Description: The Graduate Program in Neuroscience trains outstanding graduate students to earn a PhD degree in Neuroscience. We are an interdisciplinary program spanning several Departments in the Schools of Medicine, Dentistry, and Nursing. Our alumni fill top-tier academic, government, and industry positions worldwide. Our curriculum emphasizes critical thinking and experimental design through an innovative applied learning model. This coursework is completed within the first 16 months, after which students perform full-time dissertation research in a laboratory chosen from 2-3 laboratory rotations completed in the first year. Our students are fully supported by the Graduate Program in Life Sciences for their first 15 months and subsequently fully supported by their dissertation research lab. Additional support for students is provided by a T32 NIH Neuroscience Training Grant and the Meyerhoff Scholars Program that supports underrepresented students. Our students (66 in total) boast an impressive 50% success rate for securing additional individual NIH funding through F31 National Research Service Awards. Our >100 principal investigators teach and mentor students in their NIH-funded laboratories. Our research interests include, but are not limited to, addiction, synaptic and neural circuit form and function, neurodevelopment, neuroendocrinology, pain, schizophrenia, depression, neurodegeneration, stroke recovery, TBI, and cognition.

Our Location is in the heart of historic downtown Baltimore, offering all the amenities of city life while maintaining easy access to the Appalachians and the irresistible appeal of the Chesapeake Bay.

For more information, email Jenn McFarland, jmcfarland@som.umaryland.edu.

Application deadline: December 1, 2023

Application fee waivers: N/A

UNIVERSITY OF MICHIGAN

Neuroscience Graduate Program | http://neuroscience.med.umich.edu/

Program Description: The University of Michigan Neuroscience Graduate Program (NGP) is a collegial, diverse, and interactive group of students and faculty that work across the breadth of the neuroscience field. The NGP focuses on excellence in education and training of our 88 PhD students. Our program encompasses the complete spectrum of neuroscience training and research, incorporating the full range of multidisciplinary techniques in an integrative and supportive environment. The NGP program captures the excitement and interdisciplinary collaboration intrinsic to the field of neuroscience by drawing on the expertise of over 160 faculty members from more than 29 departments. The NGP at the University of Michigan was constituted in 1971, making this the longest-standing neuroscience graduate program in the United States. The Neuroscience graduate students form a cohesive group that promotes interactions among the faculty, making the NGP the nexus of the neuroscience community on campus. Graduates receive a PhD in Neuroscience that provides tremendous flexibility in choosing one's career path. There are more than 250 alumni of our Program, and these graduates work in many different areas including academic research/medicine, biotechnology, biomedical and pharmaceutical research and development, and science communication and policy. Our goal is to facilitate training of the future leaders in the field of neuroscience and to develop students that compete successfully in the scientific marketplace. For more information, email neuroscience.program@umich.edu.

For more information, email neuroscience.program@umich.edu.

Application deadline: December 1, 2023

Application fee waivers: For information about fee waivers through the Rackham Graduate School at the University of Michigan visit https://rackham.umich.edu/admissions/applying/application-fee-and-waivers/. Please contact neuroscience.program@umich.edu about additional opportunities for

UNIVERSITY OF PENNSYLVANIA

Neuroscience Graduate Group | https://www.med.upenn.edu/ngg/

Program Description: The NGG is a collaborative and interdisciplinary PhD program that provides training for

careers in neuroscience research, teaching, and more. Our training program is designed to provide a strong foundation of neuroscientific knowledge while at the same time taking into account each student's strengths, needs, and career goals.

Application deadline: December 1, 2023

Application fee waivers: For specific circumstances, we do offer a limited number of fee waivers.

UNIVERSITY OF PITTSBURGH AND UNIVERSITY OF PITTSBURGH MEDICAL CENTER

Center for Neuroscience at the University of Pittsburgh (CNUP) | https://www.cnup.pitt.edu/

Program Description: The CNUP is the central graduate program for Neurosciences in Pittsburgh. Laboratories from the University of Pittsburgh, the University of Pittsburgh Medical Center, and Carnegie Mellon University participate in this program. The next generation of neuroscientists will have unrivaled opportunities for exploration and discovery. Neuroscience research is exploding with new and more powerful tools enabling unprecedented insight into the structure, function, and diseases of the nervous system. The CNUP has over 35 years of experience producing neuroscientists who identify and investigate the most important scientific questions. At the core of our program is the balance between mastering emerging technologies and experimental design in the laboratory, and the practical skills (grant writing, literature evaluation, data presentation) necessary to become leaders in neuroscience research. Our goal is to identify students who have a passion and commitment to research and then provide the support and freedom necessary for them to reach their full potential. We train neuroscientists who will change the way we think about the nervous system.

Application deadline: December 1, 2023

Application fee waivers: Application fee waivers can be applied for during the application process. They will be processed by the Diedrich School of Arts and Sciences and not the program.

UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT SAN ANTONIO

Neuroscience Graduate Program | https://www.uthscsa.edu/academics/biomedical-sciences/programs/integrated/neuroscience

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

Application deadline: December 1, 2023 priority deadline – later applications will be accepted until January 1, 2023, but availability of potential interview dates may be limited.

Application fee waivers: NO APPLICATION FEE.

UNIVERSITY OF UTAH

Interdepartmental Program of Neuroscience or Neuroscience Program | http://neuroscience.med.utah.edu/

Program Description: The Neuroscience PhD Program at the University of Utah offers rigorous training through a combination of coursework, research training, mentoring, and professional development. More than 80 program faculty from 26 participating departments provide broad expertise from molecular and cellular neuroscience, to systems and cognitive neuroscience. The primary goal of our graduate program is to develop well-rounded scientists who are passionate about science and will become the next generation of leaders in our society.

Application deadline: December 1, 2023

Application fee waivers: Application fee can be waived for all domestic applicants. https://neuroscience.med.utah.edu/application.php

UNIVERSITY OF WASHINGTON

Graduate Program in Neuroscience | https://depts.washington.edu/neurogrd/

Program Description: The Graduate Program in Neuroscience is an interdisciplinary program that nucleates faculty and graduate students from several Departments and Schools at the University of Washington and includes over 150 faculty that can act as graduate advisors.

Application deadline: November 28, 2023

Application fee waivers: Yes. https://grad.uw.edu/prospective-students/how-to-apply/application-fee-waivers/

VANDERBILT UNIVERSITY

Neuroscience Graduate Program | https://medschool.vanderbilt.edu/brain-institute/

Program Description: Progress in improving brain health and quality of life is driven by and inextricably linked to advances in our understanding of nervous system structure and function. The distinguished training faculty of the VBI Neuroscience Graduate Program (NGP) stem from diverse fields such as Psychology, Biochemistry, Molecular Physiology, and Pharmacology and capture the multidisciplinary nature of modern neurobiological inquiry.

The NGP prepares every student to make significant contributions in neuroscience and fosters development from trainee to independent research scientist and educator by combining rigorous course work and sound training in the fundamentals of neuroscience, including the integrated study of nervous system function and disease, with opportunities for state-of-the-art research. Students have the option to emphasize either Cellular & Molecular or Cognitive & Systems Neuroscience, preparing each trainee for a future in which neuroscientists must be able to navigate from molecules to cells to neural systems and behavior.

Application deadline: December 1, 2023

Application fee waivers: Contact the VBI Director - Lisa Monteggia (lisa.monteggia@vanderbilt.edu) - or the Program Director - Bruce Carter (bruce.carter@vanderbilt.edu) - for this information

WAKE FOREST UNIVERSITY SCHOOL OF MEDICINE

Neuroscience Program | https://school.wakehealth.edu/education-and-training/graduate-programs/graduate-programs-in-neuroscience

Program Description: Neuroscience PhD training has been a component of graduate student training at Wake Forest University for approximately 30 years. The field of neuroscience is at the cutting edge of scientific developments and the Wake Forest Neuroscience Program believes its long-term returns from student training will have positive consequences for our community and nation. Neurological disorders associated with trauma, an aging population, drug addiction, and neurodevelopmental and psychiatric disorders represent urgent local and national needs. The goal of our Neuroscience training program is to provide students with:

A. A fundamental understanding of all levels of nervous system organization, from genetics, molecular, and cellular to systems and behavioral,

B. A skill set that includes extensive training in experimental design and interpretation, statistical and quantitative methodology,

C. Hands-on experience in state-of-the-art laboratories that carry out meaningful and significant research in all areas of modern neuroscience, and

D. A "Bench to bedside" appreciation of how basic neuroscience research supports and translates into treatments for neurobehavioral pathologies.

Our program's success is facilitated by a robust advisory structure for student guidance and mentorship, and an outstanding collaborative environment maintained by our diverse faculty. While preparation for a research career in the Neurosciences is the central focus of our program, we also ensure students gain experience in teaching and outreach, and exposure to an increasing number of opportunities in industry in which scientists with the training we provide go on to be extraordinarily successful. These additional experiences not only expand students' competencies and enhance their opportunities for highly impactful careers; they encourage them to maintain broad interests and open them to collaborative pursuits, including pursuing translational/clinical directions such as Clinical, Population and Translational Science, Health Disparities in Neuroscience Disorders, collaborations with industry (PhD/MBA program), commercialization and tech transfer elective courses, or industry internships.

Application deadline: December 6, 2023

Application fee waivers: We offer fee waivers for ENDURE participants. See also our website: https://school.wakehealth.edu/Education-and-Training/Graduate-Programs/How-to-Apply.

WASHINGTON UNIVERSITY IN ST. LOUIS

Neuroscience Program | https://dbbs.wustl.edu/programs/neurosciences/

Program Description: Washington University in St. Louis has a long tradition of excellence in the neurosciences. Here, Erlanger first measured nerve conduction velocity and its relation to axon diameter. In the 1950s, Levi-Montalcini, Cohen and Hamburger discovered the first neuronal trophic factor, nerve growth factor. Today, a large and interactive faculty focuses interest on almost every area of modern neuroscience ranging from molecular analysis of ion channels to positron emission tomography of the human brain to the genetics of human brain diseases.

Faculty from the departments of Neuroscience, Anesthesiology, Biochemistry and Molecular Biophysics, Biology, Biomedical Engineering, Cell Biology and Physiology, Developmental Biology, Genetics, Molecular Microbiology, Neurology, Neurosurgery, Ophthalmology and Visual Sciences, Pathology and Immunology, Physics, Psychiatry, Psychological & Brain Sciences, and Radiology serve as advisers for thesis research and serve as teaching faculty in the neurosciences. The remarkable breadth of faculty interests in neuroscience at Washington University guarantees a student's exposure to a wide range of current neurobiological problems and approaches.

Application deadline: December 1, 2023

Application fee waivers: Eligibility for a fee waiver is assessed upon submission of an application. If a fee waiver is not automatically granted, you may be eligible if any of the following criteria apply:

- Participants in Washington University Summer Bioscience Research Programs
- Students mentored by a DBBS alum
- DACA students
- Financial need

If you think you may qualify for a fee waiver based on one or more of these criteria, email dbbsphdadmissions@email.wustl.edu

YALE UNIVERSITY

Interdepartmental Neuroscience Graduate Program | http://medicine.yale.edu/inp/

Program Description: A graduate program leading to a PhD in neuroscience. Broad and diverse fields within neuroscience are represented ranging from cognition to molecular and cellular. A faculty of over 130 provides diverse opportunities for selecting a lab in which to pursue the PhD

Application deadline: December 1, 2023

Application fee waivers: Yes, application fees are waived for members of underrepresented groups and are applied for via the graduate school at the time of application

SFN ACTIVITIES FOR ENDURE STUDENTS

SATURDAY Nov 11	7:00 – 11:30 am 12th Annual NIH Blueprint ENDURE Meeting Location: Westin Washington DC Downtown Hotel, Rock Creek Ballroom 12:00 – 2:00 pm Graduate School Fair Location: WCC Hall E Description: Prospective graduate students can meet face-to-face with student advisors, program faculty, and graduate school representatives from dozens of national and international institutions at the Graduate School Fair. 12:00 – 2:00 pm Advancing Your Career Through Effective Science Writing for the Public and Creating Clear, Eye-Catching Research Statements (Professional Development Workshop) Location: WCC 207A Description: This workshop will instruct participants on how to effectively write research summaries for a variety of audiences including the public. The intended audience for the workshop is early and mid-career neuroscientists who would like to enhance their skillset by learning how to summarize their studies for funding opportunities, public programs, job applications, websites, and elsewhere. It will also assist attendees in writing about controversial/challenging topics. At the conclusion of the workshop, each participant will have drafted a summary of their own research area. 12:00 – 2:00 pm Doing Our Part to Change the Culture of Science: Becoming a Champion for Rigor (Professional Development Workshop) Location: WCC 207B Description: This workshop aims to empower neuroscientists to help change the culture of science to better emphasize high-quality, robust research rather than speedy, flashy research. Individuals often feel powerless to change systemic issues, so we will highlight researchers who have led successful efforts to change minds and policies at the trainee, laboratory, education, and departmental levels. Attendees will leave with practical next steps for improving the research environment around them. 3:00 – 5:00 pm Escape From Academia-Alternative Careers: Is There Life After the PhD? (Professional Development Workshop) Location: WCC 207A Description: This workshop will address career paths outside of academia in which neuroscience skills, big data analysis as well as other skills, would be advantageous. The panel will provide perspectives from individuals who have enjoyed diverse careers, including founding a software company, working for the government examining patent applications, marketing research with a neural twist, working in a non-profit coordinating data and research efforts, and working in a philanthropic organization related to neuroscience research. These panelists will share how they got there and advise attendees on how to follow in their footsteps.

SATURDAY Nov 11	**3:00 – 5:00 pm Practical Guide to Data Management and Sharing Mandates (Professional Development Workshop)** Location: WCC 207B Description: In the new era of big-data and data sharing, neuroscientists are being asked to become data literates. With the NIH data management and sharing mandates in effect, it is more important now than ever to develop the skills and understanding for good practice in data management and sharing. This workshop will provide a practica guide for researchers to data stewardship best practices and navigate FAIR (Findable, Accessible, Interoperable, and Reusable) data management and sharing requirements by funding agencies and journals. **5:15 – 6:30 pm Presidential Special Lecture: New Genetic Therapies for Huntington's Disease and Other Neurodegenerative Diseases — Sarah J. Tabrizi** Location: WCC Hall D Description: This lecture will offer an overview of new genetic therapies in development for Huntington's disease and similar neurodegenerative diseases. It will cover the preclinical to clinical translation pathway, the challenges and opportunities, critical learnings from success and failures, and the new phase of development of these genetic therapies. **6:30 – 8:30 pm Diversity Fellows Poster Session** Location: WCC Halls A-C Description: Join a special poster session and networking event featuring participants of the Neuroscience Scholars Program (NSP), ENDURE, D-SPAN, and SPINES. The NSP is a two-year training program open to underrepresented graduate students and postdoctoral researchers. *Scan QR code for poster information.* **6:30 – 8:30 pm FUN Poster Session** Location: WCC Halls A-C Description: The FUN poster session will feature presenters from the Faculty for Undergraduate Neuroscience (FUN). FUN is an international organization supporting neuroscience research and education at the undergraduate level. **7:30 – 9:30 pm Career Development Topics: A Networking Event** Location: WCC Halls A-C Description: Experienced neuroscientists will answer attendee questions on a wide range of topics at this informal, roundtable event. Topics include work-life balance, securing grants, setting up a lab, choosing a postdoctoral position, and careers outside of academia, among others. Nearly 30 tables will be offered at the event. During the event, attendees will have the opportunity to rotate among the tables that are of interest to them. Neuroscientists at all career stages are encouraged to attend.

SUNDAY

Nov 12

Plan Your Itinerary for Neuroscience 2023

Morning and Afternoon Scientific Program Events

• Featured lectures • Symposia • Special lectures • Minisymposia

8:00 – 12:00 pm Undergraduate Neuroscience Programs

Location: WCC Halls A-C

Description: 23 poster presentations featuring undergraduate neuroscience programs.

9:00 – 11:00 am Pursuing the Start Up Dream: Career Journeys of Neuroscientists Turned Neurotech Founders (Professional Development Workshop)

Location: WCC 207A

Description: Every neurotech company has a unique origin story embodied by the scientist who, sparked by an idea, goes from a back-of-the-napkin drawing in a coffeeshop to funding and executing on technologies to improve human health. This session brings together a diverse group of neuroscientists who will share their founder career journeys — what were the inspirations, transformative decisions, and challenges they faced along the way to improving human lives through neurotech.

9:00 – 10:00 am Meet-the-Expert: Jarvis — Cultural Influences on the Way to Do and Interpret Our Science

Location: WCC 103

Description: This session will discuss how ethnicity, gender, vocabulary, and culture affect the types of experiments scientists perform, how they interpret their findings, and what career decisions they make. This includes the terminology that neuroscience uses to describe regions and functions of the brain.

12:00 – 2:00 pm Graduate School Fair

Location: WCC Hall E

Description: Prospective graduate students can meet face-to-face with student advisors, program faculty, and graduate school representatives from dozens of national and international institutions at the Graduate School Fair.

12:00 – 2:00 pm Make a Greater Impact Using Clear and Accessible Scientific Writing (Professional Development Workshop)

Location: WCC 207A

Description: When neuroscience concepts require jargon and complex images, how do scientists meet digital accessibility criteria and make their research more intelligible to a broad audience? Addgene, the nonprofit repository with a mission of open science, is focused on accessibility as a core tenet of its mission. Join Addgene content strategists and scientific curators to learn strategies that will help scientists connect with audiences more effectively.

SUNDAY Nov 12	12:00 – 2:00 pm How I Survived Grad School: Perspectives From Black in Neuro (Professional Development Workshop) Location: WCC 207B Description: This interactive panel will explore the unwritten rules in academia through perspectives and personal stories from Black In Neuro members. This workshop will focus on giving trainees, particularly those from historically marginalized backgrounds, tips for surviving graduate school. Participants will leave the workshop with a better understanding of how to identify support networks, advocate for themselves, and navigate difficult situations. 5:15 – 6:30 pm Presidential Special Lecture: Cell Biology at the Synapse: Local Protein Synthesis and Degradation — Erin M. Schuman Location: WCC Hall D Description: Neurons are morphologically complex cells which house thousands of synapses, but contain just a single nucleus (as a source for mRNA) in the cell body. The proteins present at synapses are the drivers of synaptic transmission and plasticity. Much of the local sourcing and remodeling of synaptic proteomes arises from the localized translation of mRNAs by ribosomes and protein degradation by proteasomes. This lecture will discuss previous and current studies aimed at understanding the diversity of synapse types and functional states by local cell biological mechanisms. 6:45 – 8:45 pm Black in Neuro Social Location: The Westin (formerly Renaissance), River Birch Ballroom AB Description: Neuroscientists are invited to mingle and network with the Black In Neuro Community! This social will include a presentation of exciting Black In Neuro updates and a facilitated session for community members to share and celebrate their accomplishments over the past year. Check out BlackInNeuro.com or follow @BlackInNeuro on Twitter and Instagram for more information.

MONDAY

Nov 13

Plan Your Itinerary for Neuroscience 2023

Morning and Afternoon Scientific Program Events

• Featured lectures • Symposia • Special lectures • Minisymposia

9:00 – 11:00 am Ensuring All Your Students Know They Belong in Neuroscience (Professional Development Workshop)

Location: WCC 207A

Description: This workshop will focus on strategies that create an inclusive classroom and learning environment where all student identities are validated and supported. Speakers will discuss ways to build community, foster a sense of belonging, use trauma-informed pedagogy, and integrate culturally relevant content into neuroscience courses. Finally, the speakers will help attendees devise concrete strategies for making their own classrooms more equitable and inclusive.

9:00 – 11:00 am Building Up the Nerve to Develop Your NIH Training Application (Professional Development Workshop)

Location: WCC 207B

Description: The *Building Up the Nerve* podcast from the National Institute of Neurological Disorders and Stroke demystifies the NIH application process through wide-ranging real-world discussions with NIH staff and awardees. This interactive workshop will prepare graduate students, postdocs, junior faculty, and their mentors to apply. It will feature advice and strategies from successful awardees and reviewers, followed by time for attendees to ask questions of NIH staff in small group discussions.

11:00 – 12:00 pm Meet-the-Expert: Osumi — Networking, Mentoring, and Diversity in Neuroscience

Location: WCC 103

Description: From the point of view of a developmental neurobiologist and university vice president promoting communications and diversity, this session will discuss the importance of networking, mentorship, and the need for diverse role models to inspire the next generation of neuroscientists worldwide. Case studies and insights to help young researchers navigate this exciting and evolving field of developmental neurobiology will be shared.

12:00 – 2:00 pm Graduate School Fair

Location: WCC Hall E

Description: Prospective graduate students can meet face-to-face with student advisors, program faculty, and graduate school representatives from dozens of national and international institutions at the Graduate School Fair.

MONDAY Nov 13	12:00 – 2:00 pm Neuroethics From the Bench to the Classroom: Tools to Enhance Your Experiments, Curriculum, and Communication (Professional Development Workshop) Location: WCC 207A Description: Few neuroscientists are familiar with the problems neuroethics encompasses and the tools it provides. How does neuroethics differ from responsible conduct of research issues in neuroscience? What is the range of neuroethical issues, and which ones tend to arise in particular neuroscience specialties? How can these neuroethical issues be used to drive curriculum or undergird experimental design? Several neuroscientists who have come to neuroethics by different paths and for different reasons will share their experiences, their learning process, and how their science has benefitted. They will also take questions and collaborate with the audience on how to incorporate neuroethics more seamlessly into neuroscience education/training. 12:00 – 2:00 pm Teaching Neuroscience: New Approaches to Electrophysiology Labs (Professional Development Workshop) Location: WCC 207B Description: Recording activity from neurons is a valuable experience for undergraduates. But teaching electrophysiology has been difficult due to the expense of equipment and needed expertise. Resources are now available to remove these barriers. This workshop, aimed at present and future faculty, will present low-cost, accessible, and cutting-edge techniques such as optogenetic stimulation, recording human EEGs, mining data from the Allen Brain Institute, and extracellular recording from invertebrates using computer-based data acquisition and low-cost recording devices. 3:00 – 5:00 pm Neuroscience Departments and Programs Workshop: Skills and Best Practices for Transition Periods for Trainees and Junior Faculty in Academia (Professional Development Workshop) Location: WCC 207A Description: Many new scientists seek workforce and managerial understanding as they are setting up their own labs. At this interactive workshop geared towards senior trainees and junior faculty, experts will discuss challenges in various academic transition periods, as well as recommendations for managing time, budgets, and personnel with a focus on equity. Attendees are encouraged to bring relevant questions/problems.

MONDAY Nov 13	**3:00 – 5:00 pm Inclusion in Higher Education: Designing Training Environments to Serve All Students (Professional Development Workshop)** Location: WCC 207B Description: This workshop combines short talks and breakout discussions to highlight multiple facets of inclusive educational practices: pedagogy; institutional policies; mentoring; academic programming; and inclusion in the research lab. Faculty, administrators, and trainees will leave this workshop armed with knowledge of evidence-based best practices to promote inclusion and equipped with resources and professional connections to facilitate implementation of those practices at their home institutions. **5:15 – 6:30 pm Presidential Special Lecture: Regenerating Axons and Re-Establishing Connections for Neural Repair — Zhigang He** Location: WCC Hall D Description: Spinal cord injury and other central nervous system (CNS) traumas damage passing axons and disrupt neuronal connections, leading to unrecoverable functional deficits. This lecture will discuss the reasons underlying the failure of axon regeneration in adult CNS and progress in developing pro-regenerative strategies in experimental injury models. Further discussion will highlight the challenges and promises of advancing these findings towards effective neural repair treatments. **7:00 – 8:00pm Diversity in Neuroscience Reception** Location: Marriott Marquis, Liberty IJKL Description: A special reception in honor of the SfN diversity programs, and the NINDS-funded R25 Neuroscience Scholars Program.

Tuesday Nov 14	*Plan Your Itinerary for Neuroscience 2023* Morning and Afternoon Scientific Program Events • Featured lectures • Symposia • Special lectures • Minisymposia 12:00 – 2:00 pm Graduate School Fair Location: WCC Hall E Description: Prospective graduate students can meet face-to-face with student advisors, program faculty, and graduate school representatives from dozens of national and international institutions at the Graduate School Fair. 1:30 – 3:00 pm Natives in Neuro: Building a Community of Indigenous Neuroscientists — McLester-Davis Location: WCC Ballroom C Description: Indigenous people have contributed to science for thousands of years. From traditional ecological knowledge to the work of astronaut John Herrington and statistician Ross Ihaka, Natives in STEM have been integral to scientific progress. However, within neuroscience there are seldom spaces where Indigenous trainees can network. Sharing the stories of 5 Indigenous neuroscientists, we will chronicle the launch of NativesInNeuro and lay out a roadmap to giving back to Indigenous communities. 5:15 – 6:30 pm Presidential Special Lecture: Receptors, Synapses, and Memories — Richard L. Huganir Location: WCC Hall D Description: Neurotransmitter receptors mediate signal transduction at synapses in the brain. The Huganir Laboratory has elucidated mechanisms regulating AMPA and NMDA receptors, major excitatory neurotransmitter receptors in the central nervous system. They have focused on the role of post-translational modification and receptor-interacting proteins in synaptic plasticity and learning and memory. These studies show that receptor regulation is a major determinant of animal behavior in health & disease.

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MAKING THE MOST OUT OF SCIENTIFIC CONFERENCES

A Guide for Undergraduates to the Society for Neuroscience Annual Meeting. José-Edwards DS, et al. J Undergrad Neurosci Educ. 2017 Jun 15;15(2): E10-E12. PMID: 28690443; PMCID: PMC5480849.

ABSTRACT: The annual meeting of the Society for Neuroscience (SfN) attracts over 30,000 attendees, including many of the world's most accomplished researchers. Although it can be intimidating to attend a conference of this scale, there are many rewards for undergraduates. Based on surveys of young neuroscientists, we provide planning strategies to ensure attendees maximize their exposure and retention of the breadth and depth offered by this large conference format without becoming overwhelmed.

Figure 1. How to survive a large, international conference. Key advice for undergraduates before, during and after the SfN meeting. This two-month plan for the 5-day meeting aims to maximize a student's ability to meet and learn from colleagues.

For the full article, visit https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5480849/.

MENTORING RESOURCES

"A mentor is not someone who walks ahead of you to show you how they did it. A mentor walks alongside you to show you what you can do."

Getting the Most Out of Your Mentoring Relationship | https://neuronline.sfn.org/Articles/Professional-Development/2015/Getting-the-Most-Out-of-Your-Mentoring-Relationship

How to Find the Right Mentors and Ask for Career Advice | https://neuronline.sfn.org/Articles/Professional-Development/2015/How-to-Find-the-Right-Mentors-and-Ask-for-Career-Advice

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

Your Science Avengers: How to Assemble Your Mentoring Team | https://neuronline.sfn.org/Articles/Professional-Development/2017/Your-Science-Avengers-How-to- Assemble-Your-Mentoring-Team

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

Mentoring Compacts | https://ictr.wisc.edu/mentoring/mentoring-compactscontracts-examples/

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

PROFESSIONAL ORGANIZATIONS

Diverse venues for professional development activities, scientific presentations, and networking opportunities with research trainees, faculty, and academic biomedical research institutions.

American Indian Science and Engineering Society (AISES)
https://www.aises.org/

Annual Biomedical Research Conference for Minority Students (ABRCMS)
http://www.abrcms.org/

Association of Minority Health Professions Schools, Inc. (AMHPS)
https://amhps.org/

Black in Neuro
https://www.blackinneuro.com/

Científico Latino
https://www.cientificolatino.com/

DisabledInSTEM
https://disabledinstem.wordpress.com/

Hispanic Association of Colleges and Universities (HACU)
https://www.hacu.net/

Neuroscience Scholars Program, Society for Neuroscience (NSP)
https://www.sfn.org/initiatives/diversity-initiatives/neuroscience-scholars-program

Out in Science, Technology, Engineering, and Mathematics (oSTEM)
https://ostem.org/

Society for the Advancement of Chicanos and Native Americans in Science (SACNAS)
https://www.sacnas.org/

Vanguard Conversations with Women of Color in STEM (#VanguardSTEM)
https://vanguardstem.com/

This is the last page of the booklet but the first page of YOUR FUTURE!

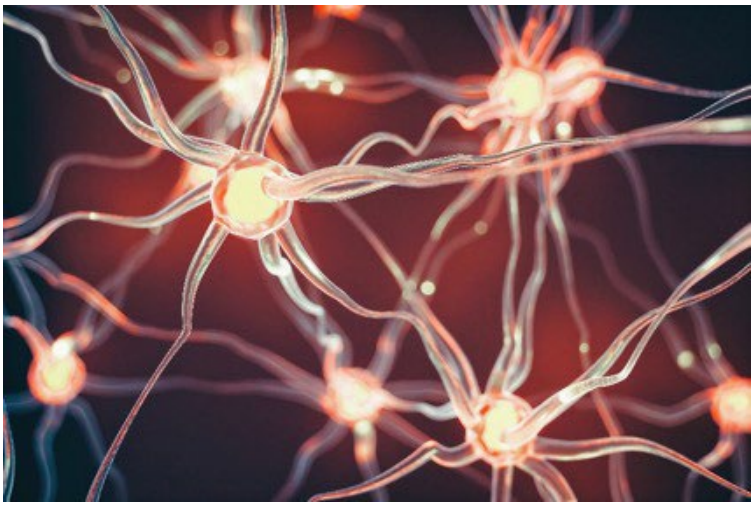
ENDURE alumni are changing the face of neuroscience and making an impact on research knowledge. Stay connected to the ENDURE network! Visit and join the ENDURE LinkedIn page, https://bit.ly/ENDURE_LinkedIn

ENDURE Outcomes *(as of Sep 2023)*: 2120 of 476 alumni (~45%) are currently enrolled in graduate programs or doing postbaccalaureate training!

- 113 in PhD programs
- 49 in clinical doctoral programs (MD or DO, MD/PhD, DPT)
- 14 in MS degree
- 36 in postbacc programs

PhD Graduate Programs of ENDURE Alum

Albert Einstein College of Medicine
Boston University
Brandeis University
Brown University
California Institute of Technology
Columbia University
Cornell University
Duke University
Emory University
Georgetown University
Harvard University
Institute of Science and Technology Austria
Johns Hopkins University
Massachusetts Institute of Technology
Michigan State University
Ponce Health Sciences University
Princeton University
Rutgers University
Saint Louis University
Salk Institute
Stanford University
Stony Brook University
Temple University
University of Alabama
University of Alabama at Birmingham
University of Arizona
University of California, Irvine
University of California, Los Angeles
University of California, San Diego
University of California, San Francisco
University of Cincinnati
University of Colorado Anschutz Medical Campus
University of Colorado Boulder
University of Colorado Colorado Springs
University of Georgia
University of Iowa
University of Massachusetts Amherst
University of Michigan
University of Minnesota
University of New Mexico
University of North Carolina at Chapel Hill
University of Oregon
University of Pennsylvania
University of Pittsburgh
University of Puerto Rico Medical Campus
University of Rochester
University of Texas at Austin
University of Texas Health Science Center at San Antonio
University of Texas Southwestern Medical Center
University of Utah
University of Washington
University of Wisconsin-Madison
University of Southern California
University of Texas at San Antonio
University of Virginia
Virginia Commonwealth University
Washington University in St. Louis
Wayne State University School of Medicine
Weill Cornell
Yale University



THANK YOU FOR YOUR PARTICIPATION!!

Stay safe and take care!