ENDURE

NIH Blueprint for Neuroscience Research

NIH Blueprint Enhancing Neuroscience Diversity through Undergraduate Research Education Experiences (ENDURE) 11th Annual Meeting

October 19 20, 2021 | Virtual

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

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

NIH Blueprint for Neuroscience Research

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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 14 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 Ph.D. programs. ENDURE provides undergraduate training through partnerships between research-intensive institutions and institutions with a substantial enrollment of neuroscience majors from diverse groups. This includes individuals from underrepresented racial and ethnic groups, individuals with disabilities, and individuals from economically disadvantaged backgrounds. ENDURE undergraduate training programs support a range of activities to increase student interest and involvement in the neurosciences, including research experiences, core and advanced neuroscience courses, seminars, and journal clubs. In FY10, five ENDURE awards were granted 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)
Greg Richards (Rose Li & Associates)
Kim Williamson (Rose Li & Associates)

For more information about BP-ENDURE and the program sites over our 11-year history, visit https://neuroscienceblueprint.nih.gov/endure-undergraduate-education

Visit and like An ENDUREing Network Facebook page @BP.ENDURE
Join An ENDUREing Network on LinkedIn groups An ENDUREing Network
Follow NINDS Office of Programs to Enhance Neuroscience Workforce Diversity on Twitter @NINDSDiversity

AGENDA

DAY 1 | October 19, 2021

Via Zoom, unless otherwise noted

Eastern Time	
2:00 – 2:10 p.m.	**ENDURE Meeting Goals and Introduction** Dr. Marguerite Matthews, Scientific Program Manager, Office of Programs to Enhance Neuroscience Workforce Diversity (OPEN), National Institute of Neurological Disorders and Stroke (NINDS)
2:10 – 2:30 p.m.	**Attending and Presenting at a Conference 101** Dr. Diana José-Edwards, Coordinator of STEM Diversity Initiatives and former WUSTL ENDURE Co-Director, Washington University in St. Louis
2:30 – 3:10 p.m.	**Breakout – Small Groups** **Networking exercises available on Pages 134-136** **Exercise 1: Presenting Yourself and Your Science (20 minutes)** • Each trainee will share their elevator pitches and receive feedback for improvement **Exercise 2: Developing Your Network (20 minutes)** • Discuss some of your strategies for networking and give an example of when networking led to a positive personal or professional outcome
3:10 – 3:15 p.m.	**Wrap-up**
3:15 – 3:30 p.m.	**BREAK & POSTER PREP**
3:30 – 4:30 p.m.	**ENDURE Scholar Poster Session** *To be held on the Gather virtual platform. If you need assistance, please email Kim Williamson (kim.williamson@roseliassociates.com)*

DAY 2 | October 20, 2021

Via Zoom, unless otherwise noted

Eastern Time	
1:00 – 1:10 p.m.	**ENDURE Meeting Goals and Introduction** Dr. Michelle Jones-London, Chief, Office of Programs to Enhance Neuroscience Workforce Diversity (OPEN), National Institute of Neurological Disorders and Stroke (NINDS)
1:10 – 1:30 p.m.	**NIH Blueprint Welcome** Dr. Rena D'Souza, Director, National Institute of Dental and Craniofacial Research (NIDCR)
1:30 – 1:55 p.m.	**Keynote Address** Dr. Theanne Griffith, Author and Assistant Professor, Physiology and Membrane Biology, University of California, Davis **Q&A**
1:55 – 2:40 p.m.	**Panel on Pathways and Perspectives on Advancing Your Career** Moderated by Dr. Mark Chavez, Associate Director, Research Training & Career Development, National Institute of Mental Health (NIMH) Each panelist will share their scientific background and address their academic journey, effective strategies to navigate some of the challenges of graduate research training, and lessons learned along the way. **Panelists:** Ariel Nieves – Hunter/NYU ENDURE alumna and doctoral student at Stony Brook University Kelvin De Leon – Hunter/NYU ENDURE alumnus and doctoral student at Brown University Thibaut Pardo-García – UPR ENDURE alumnus and doctoral student at the University of Michigan Anisha Kalidindi – Georgia State ENDURE alumna and doctoral student at the Ohio State University
2:40 – 3:00 p.m.	**Breakout** **Graduate School 101** ENDURE Scholars will discuss tips, tricks, and best practices about preparing for, applying to, and succeeding in graduate school with ENDURE Alumni Panelists. Or **NINDS Mentoring Workshop Preview** Program faculty and administrators from ENDURE and graduate training programs will meet with NINDS staff to discuss the upcoming Spring 2022 Meeting.
3:00 – 3:10 p.m.	**Closing remarks**
3:10 – 3:30 p.m.	**BREAK & FAIR PREP**
3:30 – 5:00 p.m.	**Graduate Program Recruitment and Networking Fair** *To be held on the Gather virtual platform. You should have received an email with the URL. If you need assistance, please email Kim Williamson (kim.williamson@roseliassociates.com)*

SPEAKER BIOGRAPHIES

Rena D'Souza, D.D.S., M.S., Ph.D.
Director
National Institute of Dental and Craniofacial Research (NIDCR)
Pronouns: She/her

Dr. Rena N. D'Souza is the director of the National Institute of Dental and Craniofacial Research. She oversees NIDCR's annual budget of more than $475 million, which supports basic, translational, and clinical research in areas of oral cancer, orofacial pain, tooth decay, periodontal disease, salivary gland dysfunction, craniofacial development and disorders, and the oral complications of systemic diseases.

A licensed dentist, Dr. D'Souza is recognized for her research in craniofacial development, genetics, tooth development, and regenerative dental medicine. Prior to joining NIH, Dr. D'Souza was the assistant vice president for academic affairs and education for health sciences at the University of Utah, Salt Lake City. There, she also served as a professor of dentistry, the Ole and Marty Jensen chair of the School of Dentistry and professor of neurobiology and anatomy, pathology and surgery in the School of Medicine and the department of biomedical engineering. In 2012, Dr. D'Souza was selected to be the inaugural dean of the University of Utah's School of Dentistry. She is a devoted mentor and champion of diversity in the biomedical research workforce. Since 1985, she has served as a volunteer dentist for women in need and people struggling with homelessness in Salt Lake City, Dallas, and Houston.

D'Souza received her bachelor's degree in dental surgery from the University of Bombay, India, after which she completed her general practice residency. She earned her D.D.S., Ph.D., and master's degree in pathology/biomedical sciences from the University of Texas Health Science Center in Houston.

Kelvin De Leon
Doctoral Student, Neuroscience Graduate Program
Brown University
Pronouns: He/him

Kelvin De Leon's long-term interest in neuroscience began in his AP psychology class in high school. He went on to pursue an undergraduate degree in psychology, where most of the courses he took were neuroscience-related. In college, he participated in the Blueprint initiative-Enhancing Neuroscience Diversity through Undergraduate Research Education Experiences (BP-ENDURE). This training program prepared him to approach and perform research in 4 different labs. Each lab diversified his neuroscience research experience, from the topic of interest all the way to the models used to approach the questions at hand. This is when he realized he wanted to continue his studies at a research-intensive institution and, most importantly, an institution that promotes diversity.

Kelvin then joined the Neuroscience Graduate Program at Brown University. His graduate education has exposed him to the importance of biomedical research and its relevance to the clinical setting. The

culmination of his undergraduate and graduate research experiences shaped his interest in translational neuroscience. He has established himself in Dr. Judy Liu's lab, where they work on animal models based on human disorders in order to investigate epilepsy. Kelvin is currently investigating different mutations in the plasma membrane citrate transporter (SLC13A5) and their association with early infantile epileptic encephalopathy (EIEE). His research will contribute to the understanding of the dysfunction associated with the mutations in SLC13A5 at the behavioral, circuit, and cellular levels.

It is Kelvin's scientific goal to help advance the molecular research that will lead to the development of new therapies for rare genetic disorders.

Follow Kelvin on Twitter *@DeLeonNeuro*.

Theanne Griffith, Ph.D.
Assistant Professor, Physiology and Membrane Biology
University of California, Davis
Pronouns: She/her

Dr. Theanne Griffith received her undergraduate degrees in neuroscience and Spanish from Smith College and earned her doctorate in neuroscience from Northwestern University. As a graduate student, she combined electrophysiology and molecular biology to investigate the structure and function relationship between ionotropic glutamate receptors and their auxiliary subunits. This work was the first study to identify regions within kainate receptors targeted for modulation by auxiliary subunits and was selected as an Editor's Pick in the Journal of Physiology. As a postdoctoral fellow, Dr. Griffith harnessed her knowledge of ion channel function to investigate the molecular mechanisms governing excitability of mammalian sensory neurons. This project found an unexpected role for the voltage-gated sodium channel, NaV1.1, in mediating action potential firing in a subpopulation of cold-sensing neurons and was featured on the cover of the Journal of Neuroscience. As an Assistant Professor in the Department of Physiology and Membrane Biology at The University of California Davis, Dr. Griffith investigates the cellular and molecular mechanisms of thermal sensations in health and disease, using an innovation combination of electrophysiology, transgenic mouse models, behavior, imaging, and molecular profiling. In addition to her research, Dr. Griffith is a published children's book author. The first three books in her science adventure chapter book series, The Magnificent Makers, were published in 2020 by Random House Children's Books. Books 4 and 5 are slated for release in 2021 and 2022, respectively.

Follow Dr. Griffith on Twitter *@doctheagrif*.

Diana José-Edwards, Ph.D.
Coordinator of STEM Diversity Initiatives
Washington University in St. Louis
Pronouns: She/her

Dr. José-Edwards hails from Queens, New York and received her bachelor's degree in Biochemistry from Barnard College. Through support from NIH aimed at increasing the number of underrepresented students in science, Diana worked on DNA sequencing technologies as an undergraduate

researcher at Columbia University. This experience reinforced her love for scientific discovery and she thus pursued graduate study at Cornell University's Weill Cornell Graduate School of Medical Sciences. There, she earned a Ph.D. in Developmental Biology where she studied transcriptional regulation of notochord development in *Ciona robusta*. Dr. José-Edwards then moved on to Washington University in St. Louis (WUSTL) where she has served in roles focused on STEM education, particularly initiatives dedicated to diversity, equity, and inclusion in STEM and was a Co-Director of the university's ENDURE program. Currently, Diana serves as Coordinator of STEM Diversity efforts at WUSTL where she designs resources intended to create an inclusive learning environment for students from diverse backgrounds and to advance their opportunities for matriculation into M.D. and Ph.D. programs.

Anisha Kalidindi

Doctoral Student, Molecular, Cellular, & Developmental Biology Program
The Ohio State University
Pronouns: She/her

Anisha Kalidindi completed her B.S. in Biological Science at Emory University. During her time at Emory, she was a fellow in the NIH BP-ENDURE Atlanta Net/work program and a member of the laboratory of Dr. Gretchen Neigh. A focus of her undergraduate work was to understand the mechanisms of stress in several model systems including rodents and primates. Additionally, she spent a summer studying stress susceptibility and maternal care in the laboratory of Dr. Bruce McEwen at Rockefeller University. Currently, she is a Ph.D. candidate in the Molecular, Cellular, and Developmental Biology program at the Ohio State University. She works in the laboratory of Dr. Karl Obrietan studying the molecular mechanisms governing circadian rhythms. Her thesis work examines the mechanisms of circadian clock disruption in Alzheimer's disease. Upon matriculation Anisha was awarded a University Fellowship and a spot in the Cellular, Molecular, and Biochemical Sciences Program NIH T32 training program. Recently she was awarded the D-SPAN F99/K00 award to support the remainder of her thesis work and the transition to a postdoctoral position. Outside of her lab work she enjoys working in scientific communication, specifically translating academic papers for general audiences. Her articles have been published in Scientific American and Massive Science.

Follow Anisha on Twitter *@AnishaKalidindi*.

Ariel Nieves

Doctoral Student, Neurobiology & Behavior Program
Stony Brook University
Pronouns: She/her

Born and raised in The Bronx, New York, Ariel received her bachelor's in psychology from The City University of New York Hunter College, where she began her research career through the BP-ENDURE Program. Through ENDURE, her research opportunities at Hunter College, Vanderbilt University, and Brown University cultivated her interests in investigating molecular mechanisms and sexual dimorphism of underlying neuroinflammation in stress, aging, and neurodegenerative diseases. Doctrinaire in her pursuits of

neuroscience, she continued her investigations at Stony Brook, where she is a current second-year Graduate Student in Stony Brook University's Neurobiology and Behavior Program in Neuroscience (PiN).

She is currently settled and preparing her thesis in the Zhu Lab at Stony Brook University, exploring her interests through several projects. One of these projects focuses on the microglia specific neuroinflammation and neuronal stress, and her other project focuses on role of sexual dimorphism in AD associated protein expression and neuronal dysfunction. Alongside her research, she stays active within her community by circulating information, providing mentorship to students, and creating aspects of an enriched environment to alleviate stressors in the workplace. Her main goals are to contribute to the central goals of the NIH by helping to advance the understanding of neurodegenerative disorders and to elucidate that information to the public.

Follow Ariel on Twitter *@ArielNieves11*.

Thibaut Pardo-García

Doctoral Student, Neuroscience Graduate Program
University of Michigan
Pronouns: He/him

Thibaut (pronounced Tea-bo) is currently an HHMI Gilliam Fellow and a 5th year Ph.D. candidate at the University of Michigan in Dr. Monica Dus' lab, where he studies the neurobiology of obesity. Specifically, he explores the question of why we choose certain foods over others, such as choosing to eat a cupcake instead of a salad.

Thibaut began his journey in science when he was a sophomore at the University of Puerto Rico, Río Piedras Campus. Here, he joined Dr. Carmen Maldonado-Vlaar's lab and studied the effects of endocannabinoids on mood disorders. It was at this point where he was accepted into the BP-ENDURE program, NeuroID. Afterwards, Thibaut went on to perform full-time research as a PREP scholar at the Medical University of South Carolina under Dr. Peter Kalivas' tutelage. Here, he studied the connections between the nucleus accumbens shell and the ventral pallidum in cocaine addiction. Later on, he decided to pursue a Ph.D. at the University of Michigan.

Thibaut has published three first author publications, one for each stage of his career, including one from a Ph.D. rotation. In addition to his academic accomplishments, he also served for 2 years as Director of Education for a student organization dedicated to promoting science to minority groups, and during which they won best chapter of the year. During his Ph.D., Thibaut realized he also enjoyed solving complex problems in science but from a business perspective and is now a consultant at the non-profit student organization miLEAD Consulting.

Follow Thibaut on Twitter *@ThibautPardo*.

ENDURE PROGRAM INFORMATION

BP-ENDURE AT HUNTER & NYU

HUNTER COLLEGE

http://www.bpendure.org/

Partner Institutions: Brown University, New York University, University of Michigan, Vanderbilt University, Yale University

Principal Investigator: Nesha Burghardt, Ph.D. | Hunter College of CUNY

Principal Investigator: Glenn Schafe, Ph.D. | Hunter College of CUNY

Principal Investigator: Chiye Aoki, Ph.D. | New York University

Advisor: Margarita Kaplow, Ph.D. | New York University

Program Coordinator: Kizzy Vazquez | Hunter College of CUNY

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 Ph.D. 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 PH.D. IN NEUROSCIENCES PROGRAM

MICHIGAN STATE UNIVERSITY

https://www.msubpnp.com/programs.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 at Arecibo, University of Puerto Rico at Cayey, University of Puerto Rico at Humacao, University of Puerto Rico at Ponce

Principal Investigator: William Atchison, Ph.D. | Michigan State University

Program Coordinator: Melissa Jaiman-Cruz | Michigan State University

Description: The Bridge to Ph.D. in Neurosciences Program (BPNP) was created with the objective of increasing the number of underrepresented minority 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.

BROOKLYN NEURAL NETS (NEUROSCIENCE EDUCATION AND TRAINING FOR SCIENTISTS)

BROOKLYN COLLEGE

Partner Institutions: Medgar Evers College, State University of New York Downstate Medical Center

Principal Investigator: Louise Hainline, Ph.D. | Brooklyn College

Co-Investigator: Paul Forlano, Ph.D. | Brooklyn College

Co-Investigator: Mark Stewart, Ph.D. | State University of New York Downstate Medical Center

Associate: Mohsin Patwary, Ph.D. | Medgar Evers College

Program Coordinator: Alla Chavarga, Ph.D. | Brooklyn 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 Ph.D. or M.D./Ph.D. 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. Faculty have begun to develop a full neuroscience major at Brooklyn College. Initial recruitment of the first cohort of Fellows was delayed by the pandemic, but our first cohort of B-NETS Fellows are currently participating in an intensive summer workshop experience, in anticipation of their placements in labs during the academic year, as pandemic restrictions allow.

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

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

Partnering 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: Allison Augustus Wallace, Ph.D., M.S., M.N.S. | Louisiana State University Health Sciences Center New Orleans (LSUHSC-NO)

Co-Investigator: Scott Edwards, Ph.D. | LSUHSC-NO

Co-Investigator: Hamilton Farris, Ph.D. | LSUHSC-NO

Co-Investigator: Patricia Molina, M.D., Ph.D. | LSUHSC-NO

Co-Investigator: Fern Tsien, Ph.D. | 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, non-

residential/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: Lincoln University, University of Maryland

Principal Investigator: Ingrid R. Olson, Ph.D. | Temple University

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

Recruitment and Retention Coordinator: Lisa Briand, Ph.D. | Temple University

Community Engagement Coordinator: Debra Bangasser, Ph.D. | Temple University

Community Engagement Coordinator: Heather Lewis-Weber | Temple University

Program Coordinator: Nattalya Pacheco Serra | 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: Jose García-Arrarás, Ph.D. | University of Puerto Rico, Río Piedras Campus

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

Administrative Assistant: 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: Mariann Weierich, Ph.D. | University of Nevada, Reno

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

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

Program Coordinator: Kathryn Padmos | 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://ugresearch.ucsd.edu/research-programs/start-neuro/index.html

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

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

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

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

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

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

Co-investigator: Eduardo Macagno, Ph.D. | 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 Ph.D. 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 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: Horacio O. de la Iglesia, Ph.D. | University of Washington

Co-Investigator: Eric H. Chudler, Ph.D. | University of Washington

Program Manager: Jessica Huszar, Ph.D. | 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: Erik Herzog, Ph.D. | Washington University in St. Louis

Principal Investigator: Diana José-Edwards, Ph.D. | Washington University in St. Louis

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

Description: The Washington University in St. Louis (WUSTL) ENDURE undergraduate research program

prepares undergraduates from diverse backgrounds for neuroscience Ph.D. 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

Andrea Viviana Abanto

Pronouns: She/her

Email: andreavivianaabanto@gmail.com

Home Institution: San Diego State University

Academic Level: Junior

Undergraduate Major and Graduation Date: Psychology, 2022

Science Interests: Neuroscience is a fascinating topic for me; it is a science that I would love to research in depth. The brain is the most complex and least understood organ; its impact in the body is tremendous. I believe that in the next few years, neuroscience will help us to understand neurological diseases like never before. I would like to be a part of the group of scientists bringing revolutionary advances to the field.

Career Goals: As an undergraduate student, my main goal is to graduate next year and start applying to graduate schools to study neuroscience. I would like to go to medical school simultaneously.

Zoe Abeyta

Pronouns: She/her

Email: zabeyta@nmsu.edu

Home Institution: New Mexico State University

Academic Level: Senior

Undergraduate Major and Graduation Date: Psychology, 2021

Home Institution Mentors: Bruce Appel and Jim Kroger

Science Interests: From my interest in psychology, I enjoy how neuroscience contributes to patterns of human behavior.

Career Goals: I aim to be a clinical neuropsychologist working in a hospital setting and treating patients.

Arie L. Aelmore

Pronouns: He/him

Email: aelmort@wwu.edu

Home Institution: Western Washington University

Academic Level: Junior

Undergraduate Major and Graduation Date: Behavioral Neuroscience, 2023

Science Interests: The innerworkings of the mind are not well understood, especially how biological mechanisms can affect the states of mind and behavior. This is what drives my interest in neuroscience.

Career Goals: I would like to go to medical school to further research in Transgender healthcare. Developing a better standard of care, by incorporating more long-term research in both psychological and biological aspects.

Uchechukwu Agali

Pronouns: They/them

Email: ucheagali@gmail.com

Home Institution: Harris-Stowe State University

Academic Level: Senior

Undergraduate Major and Graduation Date: Biology, May 2022

Science Interests: Neuroscience is an ever-changing field, and the cutting age research is always interesting. I'm especially interested in applying neuroscience to public policy.

Career Goals: I would like to become a developmental-behavioral pediatrician.

Oumayma Agdali

Pronouns: She/her

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Home Institution: Hunter College

Academic Level: Junior

Undergraduate Major and Graduation Date: Psychology with a concentration in Behavioral Neuroscience, June 2023

Science Interests: The most important aspect to understanding everything around us, including ourselves, is the mind and the brain. Neuroscience is a vast field that covers so many aspects including why we behave the way we do, how we interact with the world around us, how that world interacts with us, and how we perceive reality and why we perceive it that way.

Career Goals: I hope to pursue my Ph.D. in Neuroscience, with either a cognitive or molecular focus. I am interested in both the study of consciousness and diseases of the mind.

Milagros Alday

Pronouns: She/her

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Home Institution: University of Arizona

Academic Level: Sophomore

Undergraduate Major and Graduation Date: Neuroscience and Spanish, Spring 2024

Science Interests: What interests me the most about neuroscience is how it is such an interdisciplinary subject. It combines philosophy and psychology as well as biology and chemistry. It is such a large and intricate subject that we are still making so many new discoveries and still have so much that we don't understand.

Career Goals: My career goal is to become a doctor, specifically a neurosurgeon or neurologist. I would like to focus on child/pediatric neurology or functional neurosurgery.

Daniela Anderson

Pronouns: She/her

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Home Institution: Ana G. Mendez University

Academic Level: Junior

Undergraduate Major and Graduation Date: Biology, May 2023

Science Interests: I have always thought of the study of neuroscience as an exciting way to explore and learn about all aspects of life and society. The thing that excites me the most about this discipline is being able to study the mechanisms and functionality of neuropeptides that aid in the regulation of a variety of behaviors. I believe understanding this neurobiology can lead to groundbreaking knowledge that will improve the lives of millions of people around the world.

Career Goals: My career goals are aimed towards completing an M.D./Ph.D. program. With this, I will be able to continue my research interests, expand my scientific knowledge, and earn a title that will allow me to directly impact the lives of my patients. I consider both the medical and research field extremely rewarding professions and believe I will excel in either one, or both simultaneously. My ultimate goal is to help improve the quality of life of as many people as I can.

Eboni Monae Arnold

Pronouns: She/her

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Home Institution: University of Miami

Academic Level: Senior

Graduation Date: May 2022

Home Institution Mentor: Kevin Collins

Science Interests: Over the years, I have fallen in love with developmental and regenerative neuroscience. Through ENDURE, I also had the opportunity to work with zebrafish, and I am very excited to continue research with this model in the future!

Career Goals: After obtaining my Ph.D., I want to experience a post-doctoral program abroad, and then possibly return to the States to work at a public or private research institution. I have also been very passionate about kickstarting graduate level biomedical research programs at HBCUs.

Sydney K. Arriaga

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Home Institution: University of Arizona

Academic Level: Junior

Undergraduate Major and Graduation Date: Neuroscience and Cognitive Science, May 2023

Home Institution Mentors: Katrina Miranda and Ulises M. Ricoy

Science Interests: Neuroscience excites me because of its universality. It is an ever-expanding, ever-improving existential philosophy that can be studied, evaluated, and rectified.

Career Goals: My goals are to make a positive difference in treating mental health.

Niambe Bacon

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Home Institution: Lincoln University

Academic Level: Junior

Undergraduate Major and Graduation Date: Biology, 2023

Science Interests: What excited me about neuroscience is how it can be related to so many different things and professions.

Career Goals: My goal is to open my own practice in the dental field and help provide underprivileged children with dental care.

Citlalli Tomas Baltazar

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Home Institution: Temple University

Academic Level: Junior

Undergraduate Major and Graduation Date: Neuroscience, Spring 2023

Science Interests: What excites me about neuroscience is the fact that it can be combined with nearly every field (ex: medicine, engineering, physics, pharmacy) and lead us to unrelated findings. These conclusions can then be connected to create a web that explains how the brain works.

Career Goals: I hope to become a researcher/principal investigator and investigate drug addiction and/or cannabis and to collaborate with other people who have knowledge in this area.

Daniela Bermudez

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Home Institution: University of Arizona

Academic Level: Senior

Undergraduate Major and Graduation Date: Neuroscience and Cognitive Science, December 2022

Science Interests: What excites me about neuroscience is that there is so much yet to be discovered about the brain. I used to think that neuroscience was a narrow field of research, but the brain is limitless, and so are all the fields of study related to the brain. There is opportunity to further treatments by studying the brain, which in turn would improve people's lives, as well as let us advance society.

Career Goals: I hope to relate neuroscience to the education system in America. I believe that by better understanding how the brain learns, we can write better policies for public education. Topics related to bilingual brains, culture and neuroscience, and current teaching practices could help us improve the way children and adolescents learn school content. I'd like to find a field of neuroscience that relates to education.

Keimarie Berrios

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Home Institution: University of Puerto Rico, Río Piedras Campus

Academic Level: Senior

Undergraduate Major and Graduation Date: Integrative Biology, May 2023

Home Institution Mentor: Carmen Maldonado-Vlaar

Science Interests: Neuroscience is a multidisciplinary field that will benefit me in my future studies, which are oriented towards the pharmaceutical industry. Also, I am interested in understanding the relationship between pharmacy and this field, like how dependencies develop to certain drugs and how to understand the psychoactive effect this could have in a patient.

Career Goals: My goals include graduating with a good GPA and expanding my experiences in different areas of biology to be a more eligible and competitive student to continue my graduate studies in the field of pharmacy. As for my long-term goals, after completing my bachelor's degree in biology, I want to continue my graduate studies until I get a doctorate in pharmacy. Despite being a field with many opportunities and work options, I would like to make a Pharm.D. so that I can practice as a pharmacist. Although I do not want to limit the possibility of getting a Ph.D. in neuroscience and continuing in the field of research.

Cassandra Blew

Pronouns: She/her

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Home Institution: University of Colorado, Boulder

Academic Level: Junior

Undergraduate Major and Graduation Date: Neuroscience and Psychology, May 2023

Home Institution Mentor: Angela Bryan

Science Interests: I am fascinated by cognition and the loss of it due to disease, aging, and/or injury. I hope to study neurodegeneration and dementia as a professional but aspire to learn all I can about normal cognition and memory to better comprehend their impairments.

Career Goals: My highest ambition is to become a physician scientist that specializes in geriatric medicine and cognitive neuroscience in hopes to directly improve patients' quality of life with individualized, science-based treatments.

María Fernanda Bonilla Gutiérrez

Pronouns: She/her

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Home Institution: University of Puerto Rico, Río Piedras Campus

Academic Level: Junior

Undergraduate Major and Graduation Date: Cellular Molecular Biology, 2024

Home Institution Mentors: José E. García-Arrarás and Carmen Maldonado-Vlaar

Science Interests: What excites me most about neuroscience is how in the process of learning how the brain works we get to also understand ourselves better.

Career Goals: My career goals are to pursue a Ph.D. in neuroscience. I want to learn more about the brain and pursue what makes me curious.

Shelby Brunenieks

Pronouns: She/her

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Home Institution: University of California San Diego

Academic Level: Junior

Undergraduate Major: Cognitive Science with specialization in Neuroscience

Science Interests: I'm most excited to learn about neurodegenerative diseases as well as consciousness.

Career Goals: As of now, I am considering pursuing an M.D. program, possibly a Ph.D., but I am not entirely sure.

Devin Madison Burris

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Home Institution: University of Central Florida

Academic Level: Senior

Undergraduate Major and Graduation Date: Biomedical Sciences, Spring 2022

Home Institution Mentors: Karl Chai, Charissa de Bekker, and Alicia Hawthorne

Science Interests: Neuroscience is the great molecular frontier. On a macroscopic scale, everyone talks about space being the final frontier but on a microscopic level, it's neuroscience.

Career Goals: I want to research gene-therapies for neurological disorders. I also hope to become a policy advisor for gene and cell therapies as new developments are made in the field.

Melody Chao

Pronouns: She/her

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Home Institution: University of California San Diego

Academic Level: Junior

Undergraduate Major and Graduation Date: Neurobiology, June 2023

Science Interests: The complexity of the brain and how much is still unknown about it is exciting to me. I see the brain as a controller for who we are and what we do, and yet the mechanisms behind much of it is a mystery. What both interests and excites me as well is how psychiatric disorders can affect the structure of the brain, and what can be done to remedy it.

Career Goals: I want to obtain my Ph.D. in neuroscience and become a neuropharmacologist. Afterwards, I want to become a clinical researcher and focus on the development of new drugs for psychiatric disorders.

Trinity Charles

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Home Institution: Western Washington University

Academic Level: Junior

Undergraduate Major and Graduation Date: Behavioral Neuroscience, 2023

Home Institution Mentor: Sheri Mizumori

Science Interests: Neuroscience is connected to everything. It's a never-ending book. Information is constantly being added or updated. Studying for this degree will not only give me knowledge for my career but for my life.

Career Goals: My career goals include women, gender, and sexuality studies. I would love to be a part of or build a small clinic for teenagers where I hope to run tests, counsel, and educate them on their sexuality, anatomy, and everything in between.

Nancy Kent Collie-Beard

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Home Institution: Hunter College

Academic Level: Junior

Undergraduate Major and Graduation Date: Biology - Behavioral Neurobiology, Spring 2022

Home Institution Mentor: Nesha Burghardt

Science Interests: I love neuroscience mostly because of the ability to consider questions through multiple lenses and apply the observations to human experiences. I am particularly interested in the neural circuitry of reward pathways and the molecular bases for maladaptive behaviors. I also have an interest in the neurobiology of sexual assault, specifically the lasting changes in the brain following assault and the implications of these data for therapies and interventions. Lastly, I am interested in the neuroscience of prisons and re-entry, and how understanding the biological and social deprivations of incarceration may help us progress to a more compassionate legal process.

Career Goals: I hope to go on to earn my Ph.D. in behavioral neuroscience. I aspire to pursue my own research, looking at the circuitry related to dysfunctions of inhibitory controls. It is also very important to me to provide mentorship and teach the next generation of neuroscientists and researchers.

Makayla S. de la Oliva

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Home Institution: University of Colorado Denver

Academic Level: Junior

Undergraduate Major and Graduation Date: Psychology, 2022

Home Institution Mentor: Sondra Bland

Science Interests: Neuroscience research is an interesting and exciting field to partake in. What excites me the most about it is being able to discover data that no one else has before and then sharing it with other researchers so they can use it to further their own research, data, and knowledge. I am the most interested in behavioral neuroscience research and the role that mental illness or addiction plays in it.

Career Goals: I hope to enter a Ph.D. program after undergrad and then work in academia while also conducting research. I would love for my research to be focused on mental illness, degenerative disorders, or addiction.

Beatriz de la Rea

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Home Institution: New York University

Academic Level: Senior

Undergraduate Major and Graduation Date: Neural Science, May 2022

Home Institution Mentors: Hannah Gattuso, Ashley Medina, and Katherine Nagel

Science Interests: I have never been someone that can take a fact just as it is; I have to know the why, the source of the reason. In order to learn, I have to take extra time to trace out paths mentally and physically to visualize the processes. While I used to resent this process about myself, I've come to appreciate it as a strength of mine: the craving to genuinely learn. With that, I have been drawn to research and neuroscience, because I feel like they are complex and built upon processes, I just need to find the source.

Career Goals: I am pursuing a Ph.D. in neuroscience, in either a cellular/molecular or behavioral neuroscience program. However, in the past year, I began to recognize the disconnect between leaders in academia and the general public. That questioning eventually strengthened my desire to follow this path towards research, because I want to be a person that is able to bridge those gaps. With my passion for the field and love for connecting with many types of people, I believe I can be key in building the bridge between researchers and the public, which I think is necessary for science to thrive.

Ian Alberto Díaz Nieves

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Home Institution: University of Puerto Rico, Río Piedras Campus

Academic Level: Senior

Undergraduate Major and Graduation Date: Cellular-Molecular Biology, May 2022

Home Institution Mentors: José E. García-Arrarás, Alfredo Ghezzi, and Carmen Maldonado-Vlaar

Science Interests: I find the study of the nervous system to be one of the most complex subjects that humans are currently trying to understand. How does consciousness arise? What even is consciousness? How will we solve the neurological afflictions that society faces on a constant basis? Things like addiction, depression, social anxiety. I believe that the more we discover about the brain and ourselves, the more possibilities we make available for future generations of scientists to expand on and go farther beyond.

Career Goals: Once I graduate from the University of Puerto Rico, I wish to attend graduate school to pursue a Ph.D. in neuroscience. In the longer-term, I hope to become a principal investigator at my undergraduate institution and help guide other young people who are interested in neuroscience but have no clue where to begin on their journey.

Bra'a Durubeh

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Home Institution: University of California San Diego

Academic Level: Junior

Undergraduate Major and Graduation Date: Neurobiology, June 2023

Home Institution Mentors: Brenda Bloodgood and Ashley Juavinett

Science Interests: I am thrilled in the constant unknown that is derived from a known. I like that neuroscience is vast and can be applied in numerous ways directly and indirectly. The excitement that a neuroscientist feels performing research or expanding one's knowledge, I believe, is genuinely unable to be matched.

Career Goals: I am contemplating choosing one career from the many intriguing careers there are. Thus, I am trying to explore what I enjoy doing the most that will be both constantly fascinating to me constantly in the coming years and beneficial in aiding society.

Paola Eusebio-Severino

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Home Institution: Interamerican University of Puerto Rico, Metropolitan Campus

Academic Level: Senior

Graduation Date: June 2023

Home Institution Mentor: Monica Nadal-Quiros

Science Interests: I would like to do a Ph.D. in neuroscience since I want to be an ophthalmologist and I would like to learn how vision is involved with the nervous system.

Career Goals: I want to study medicine with a focus on the branch of ophthalmology.

Alexdiel Figueroa Pérez

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Home Institution: University of Puerto Rico, Río Piedras Campus

Academic Level: Junior

Undergraduate Major and Graduation Date: Interdisciplinary Studies in Natural Sciences, May 2023

Home Institution Mentors: José E. García-Arrarás and Carmen Maldonado-Vlaar

Science Interests: What excites me most about neuroscience is how different brain mechanisms are involved and underlie the different behaviors. Specifically, I feel intrigued about the brain mechanisms that modulate anxiety behaviors. Currently, I work in a lab that studies these brain mechanisms at the cellular level, but I'm looking forward to studying the mechanisms also at a molecular level in the near future. I am also interested in the cellular and molecular mechanisms that are involved in depression. Both of these topics (anxiety and depression) are of big relevance in today's society, and I feel compelled to contribute through neuroscience research.

Career Goals: When I graduate, I will seek to obtain a Ph.D. in Neuroscience. After obtaining my Ph.D., I will train as a post-doctoral scientist in industry to gain the necessary tools in order to combine academic research with patent development. By doing this, I can contribute to transform Puerto Rico into having a world-class research and development focus. Upon completion of my postdoctoral training, I will be better prepared to establish my lab in research and development in an academic setting in Puerto Rico.

Daisy Flores

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Home Institution: University of California San Diego

Academic Level: Junior

Undergraduate Major and Graduation Date: Ecology, Behavior and Evolution, June 2023

Science Interests: What excites me most about neuroscience is its complexity and its intricate processes that determine how and why we navigate the world. I find the evolution and development of brains to be fascinating; it is the foundation of who we are.

Career Goals: My career goal is to become a pediatric oncologist and work for non-profits that deliver medical attention to those who need it.

Sari Fresquez

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Home Institution: New Mexico State University

Academic Level: Senior

Graduation Date: December 2022

Home Institution Mentors: Mary Alice Scott and Graciela Unguez

Science Interests: My interests regarding neuroscience are in neuroanatomy and neuropharmacology. I would like to conduct more extensive research on how psychotropic drugs affect human behavior long term due to chronic illness and how these drugs can contribute to environmental stress over a long period of time.

Career Goals: My goal is to become a forensics pathologist assistant. In order to achieve this goal, I will finish my undergraduate degree in microbiology and human biology. Then, I will move onto graduate school. Graduate school will educate me on further interests in research and help me expand my knowledge to apply to a forensics pathologist assistant program in the near future.

Rebeca Fuquen

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Home Institution: University of Maryland

Academic Level: Sophomore

Undergraduate Major and Graduation Date: Animal Science, 2024

Home Institution Mentors: Lisa Briand, Catherine Carr, and Ingrid Olson

Science Interests: I am excited to learn about neural functions in general, especially auditory mechanisms in snakes since I will be focusing on this at my lab internship.

Career Goals: I am interested in pursuing neuroscience from a veterinary standpoint; however, I am also considering pursuing scientific illustration or possibly wildlife research.

Nicole Granados

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Home Institution: University of California San Diego

Academic Level: Junior

Undergraduate Major and Graduation Date: Human Biology, June 2023

Science Interests: What excites me most about neuroscience is knowing that there is a gap in information in various neuroscience topics and that the field as a whole is working to bridge this gap.

Career Goals: I am interested in community health/outreach. I would like to be able to give back to

disadvantaged communities and give them the tools they need to advocate for themselves in medical settings.

Gabriela Nicole Hernández-Busot

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Home Institution: University of Puerto Rico, Río Piedras Campus

Academic Level: Senior

Graduation Date: May 2023

Home Institution Mentor: Demetrio Sierra Mercado

Science Interests: The topics that most interest me within neuroscience are drug development and behavior.

Career Goals: I aspire to continue doing research within the neuroscience field and also to apply my knowledge to the clinic. To accomplish this, I would like to apply to a combined program and become an M.D./Ph.D.

Skyler Hidalgo-Andrade

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Home Institution: Washington State University

Academic Level: Junior

Graduation Date: 2023

Home Institution Mentors: Susan Ferguson and Liza Severs

Science Interests: I have always found interest in how the brain functions. The brain is absolutely fascinating in the way it shapes us into who we are, our behavior, and the mechanisms behind it. I am curious in learning about the wonders of the brain and pursuing a career in neuroscience. I find enthusiasm in this field that continues to grow and evolve. I want to be a lifelong learner and discover many of the mysteries of the brain. Becoming familiar with the complexity of such a field can allow me to explore the mechanics of it through research and advances in technology.

Career Goals: My career goals are to pursue my undergraduate studies in neuroscience and further go to medical school and specialize in an area related to neuroscience.

Munassar Hussein

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Home Institution: Brooklyn College

Academic Level: Junior

Undergraduate Major and Graduation Date: Psychology, 2022

Home Institution Mentors: Alejandra Castillo and Paul Forlano

Science Interests: The field of neuroscience is filled with mystery when it comes to the human mind. I've built this fascination with human behavior and what caught my attention most about this program was the research part of it and how we will be working hands on with mentors. I just find it very exciting to be able to work with these neuroscientists through their research where the research might lead to new discoveries and build on the knowledge I have and the entirety of psychological history.

Career Goals: My career goals are pretty blurry at the moment. It's still very difficult to picture where I'll be but I know it's somewhere in the medical field. I want to be conducting research and being at the cutting edge, discovering new things, and unlocking the mysteries of the human mind.

Claudia S. Irizarry-Hernandez

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Home Institution: University of Puerto Rico at Bayamon

Academic Level: Senior

Undergraduate Major and Graduation Date: Biology, 2023

Home Institution Mentors: José E. García-Arrarás, Alfredo Ghezzi, and Carmen Maldonado-Vlaar

Science Interests: What interests me most about neuroscience is behavioral research in animal models, specifically d. melanogaster.

Career Goals: I am unsure about pursuing a career in academia or industry, but I am sure about the fact I want to pursue a graduate degree (Ph.D. preferably).

Monica Jensen

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Home Institution: University of California San Diego

Academic Level: Junior

Graduation Date: June 2024

Home Institution Mentors: Brenda Bloodgood, Terry Gaasterland, Ashley Juavinett, and Eduardo Macagno

Science Interests: I am extremely interested in studying neuroscience because the brain is undeniably complex and accounts for an endless number of factors in life. I hope to understand how exactly the brain works in regards to neurological diseases and the impact it has on aspects of our daily life. I am fascinated by how neurons and each area of the brain can be manipulated and how they interact with each other to produce the results they do.

Career Goals: I hope to be able to work with knowledgeable and innovative scientists of all professions to progress further in my personal, professional, and academic goals. I also hope to understand the brain well enough to propose treatments and grasp the brain's plasticity of each neuron and area.

Mariyah Jiwanji

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Home Institution: Temple University

Academic Level: Junior

Undergraduate Major and Graduation Date: Neuroscience, May 2023

Home Institution Mentors: Charlotte Bavley and Mathieu Wimmer

Science Interests: Neuroscience is a rapidly developing field, and requires experimentation and exploration without borders, which I think is fascinating in itself. The field also allows for a combination of biology, chemistry, psychology, and even philosophy which we are able to integrate into studying the brain.

Career Goals: After graduation, I plan to pursue medical school and become an emergency medicine physician.

Odelia Johnson

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Home Institution: Brooklyn College

Academic Level: Junior

Graduation Date: 2023

Science Interests: Neuroscience is an entire world all together. What really amazes me is the chemical aspect of neuroscience. Various neurotransmitters work together on a microscopic scale to control various parts of our body. They mysteriously work together as if they had their own conscience. Additionally, they play a part in the emotions we experience that contribute to our social lives and who we are as individuals. Additionally, they play a big role in our lifestyle. This area also allows you to draw on many interdisciplinary fields to gain an in-depth study, which is all the more exciting!

Career Goals: My experience with the death of a loved one from a neurodegenerative disease, Alzheimer's, has really driven me to want to pursue a research related career in studying and treating this disease. I am currently in a Chemistry BS program and after I hope to pursue a Ph.D. program that will offer me advanced training in the field of neuroscience.

Naru Kang

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Home Institution: University of Maryland, College Park

Academic Level: Junior

Undergraduate Major and Graduation Date: Psychology and General Biology, May 2023

Science Interests: I love that I get to study what makes us human, what gives us our consciousness on a molecular level. It's so cool to see neuroscience come together with one of my majors, psychology, and be

able to make connections between the two fields and get excited whenever I find a concept that translates from one field to the other.

Career Goals: I plan to pursue an M.D./Ph.D. after my undergraduate degree. I want to pursue clinical research in the field of medicine/neuroscience, and do clinical work with my M.D.

Milana Khaitova

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Home Institution: Hunter College

Academic Level: Senior

Undergraduate Major and Graduation Date: Psychology, 2022

Home Institution Mentor: Tracy A. Dennis-Tiwary

Science Interests: Neuroscience is exciting because one can dive into exploring the brain through various lenses to better understand how the brain and body interact. One can look at neurons, the nervous system, brain structures, and so on, to gather valuable information. Neuroscience allows for a multi-disciplinary approach where adding survey methods, physiological tests, and observational methods is possible. I am interested in this multi-disciplinary approach, as it allows me to better visualize the bigger picture of how the brain and body connect, and how mood disorders may impact one's physiology or behavior in certain contexts.

Career Goals: My goal is to work in academia and continue exploring individual differences in stress responses in different types of mood disorders. I want to understand both the collective's experience with stress and the individual's experience. I hope to ultimately become a professor of psychology, teach experimental methods and/or content courses, and eventually open my own laboratory, where I could apply this multidisciplinary approach to my experiments.

Fatema Kitabwalla

Pronouns: She/her

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Home Institution: Temple University

Academic Level: Junior

Undergraduate Major and Graduation Date: Neuroscience, 2023

Home Institution Mentor: Nick Ruiz

Science Interests: The fact that we have so much yet to learn and discover about the brain is so fascinating to me. The fact that there are things we don't know about one of the major organs in our body is mind blowing to me.

Career Goals: As of right now, I hope to continue on the path of research in the neuroscience field, hopefully with a focus in clinical research.

Natalya Krutovska

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Home Institution: Hunter College

Academic Level: Senior

Undergraduate Major and Graduation Date: Neurobiology, 2022

Home Institution Mentors: Kemile Jackson and Kizzy Vazquez

Science Interests: I am inspired by research ideas that combine concepts of artificial intelligence with neuroscience theories and lead the effort to predict nervous system function and uncover general principles. I am equally drawn to the novelty and intricacy of the neurogenetic precision medicine approach. I believe that precision medicine and Artificial Intelligence will be invaluable assets that drive advances in the future of healthcare, and I look forward with great anticipation to being a part of leading this methodological shift that will aid us in diagnosing, treating, and predicting neurological disease.

Career Goals: After completing my undergraduate degree, I plan to enroll in an M.D./Ph.D. program and would like to ultimately work in a research-led medical university setting. As an academic researcher, I plan on teaching classes, mentoring future scientists, and harnessing my research experience to spearhead a lab that uncovers molecular mechanisms of neurological disorders and translates these findings into evidence-based treatments in clinical settings. More specifically, I intend to contribute to the advancement of precision medicine research to further deconstruct brain circuit abnormalities that occur during neurological disorders or traumas through innovative approaches in systems and computational neuroscience.

Edwin Laboy Torres

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Home Institution: Pontifical Catholic University of Puerto Rico

Academic Level: Senior

Undergraduate Major and Graduation Date: Biomedical Science, May 2022

Home Institution Mentor: Ceidy Torres Ortiz

Science Interests: Neuroscience is such a broad and interesting field. There is still so much we cannot understand yet and so many therapeutics to be developed before making patients' lives better. During my project, this summer I had the chance to see firsthand how toxic molecules can modulate the genes expressions. Being part of a lab that is reporting a novel protein crosstalk was exciting and opened my eyes to see science from a perspective I have never seen before. How we thought worked may not be exactly as we understood, and we must consider all pathways as a whole and not as sectors in the system.

Career Goals: My goal is to get into graduate school. I plan on obtaining a Ph.D. degree in Bioinformatics and focusing on research. Drug discovery is an area that really excites me, as well as using in-silico methods to obtain insight on how these molecules interact with the desired targets. Using computer power as leverage to calculate and predict procedures that would have taken a very long time in a new way is exciting. A dream of mine had always been starting a biotech startup. Developing new, safer, and more accessible therapeutics should be a priority in the industry.

Alexus Lawrence

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Home Institution: Brooklyn College

Academic Level: Junior

Graduation Date: 2023

Home Institution Mentors: Alejandra Castillo, Alla Chavarga, Paul Forlano, and Louise Hainline

Science Interests: What interests me most about neuroscience is mental health.

Career Goals: I want to become a scientist/doctor.

Caroline Lewis

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Home Institution: Mount Holyoke College

Academic Level: Junior

Undergraduate Major and Graduation Date: Neuroscience and Behavior, 2023

Home Institution Mentor: Kenneth Colodner

Science Interests: I am most excited about neuroscience when I can see the connection between chemical reactions and human behavior. I love that what makes people unique from each other is linked to the biological events that take place in the nervous system. I love learning as much as we can from this complex and mysterious organ called the brain.

Career Goals: I plan to get a Ph.D. in Neuroscience. I am interested in studying the cellular and molecular aspects of Alzheimer's disease pathology. I would love to help uncover the mechanisms of neurodegeneration and help develop possible therapies and diagnostic methods.

Justin Lopez-Roque

Pronouns: He/him

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Home Institution: Washington University in St. Louis

Academic Level: Junior

Undergraduate Major and Graduation Date: Cognitive Neuroscience, May 2023

Science Interests: What excites me most about neuroscience is the possibility of understanding human behavior deeper than those before us. I want to be able to understand why and how a person reacts and behaves in certain ways.

Career Goals: My career goal is to get a Ph.D. in cognitive neuroscience and either create my own lab or join an existing lab focusing on emotional development for adults and children.

Mustapha Major

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Home Institution: University of Colorado Denver

Academic Level: Senior

Undergraduate Major and Graduation Date: Psychology, Summer 2022

Home Institution Mentors: Sondra Bland and John Thompson

Science Interests: The brain is at the center of who we are, and I want to understand everything there is about how we come to be.

Career Goals: I would like to do research in consciousness and perception.

Miguel Martinez

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Home Institution: University of Arizona

Academic Level: Senior

Undergraduate Major and Graduation Date: Neuroscience with emphasis in Computation, Fall 2022

Science Interests: As computing power has increased and biosensors have become smaller and more accurate, the future of modulation of the brain and different regions comes closer into reach. Our perceptions lock us into reality but if we can interpose a Brain-Computer Interface (BCI), then maybe we can change what reality we want to experience. This also means those who lost their sight would not be able to see. Those with locked-in syndrome would be able to experience more than what their room allows them. It may not be in my lifetime but working towards this future makes my heart race with impatience.

Career Goals: My first goal would be to join a diverse research group with a burning curiosity and indominable determination. I want to work with this group to research different or novel ways of brain modulation and publish papers. Using what we may learn, we can create and develop new techniques or technology, patent any technology we develop, and open a company with this research group. We can continue researching and enter other markets to expand the company and its research resources. We can advocate and lobby to ensure that the future of neuromodulation isn't abused and that proper safeguards are being used.

Alexandra Martinez Lopez

Pronouns: She/her

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Home Institution: Wellesley College

Academic Level: Senior

Undergraduate Major and Graduation Date: Neuroscience, May 2022

Science Interests: What excites me most about neuroscience is that there is so much we don't know about

the brain! Particularly, we don't know how the brain interacts with other organs and systems during health and disease.

Career Goals: I aspire to become an M.D./Ph.D. in the field of neuroscience or neuroimmunology. My goal is to pursue a career as a physician-scientist and investigate novel therapeutic targets for neuroimmunological and autoimmune diseases.

Megan Maxwell

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Home Institution: Washington University in St. Louis

Academic Level: Recent graduate

Undergraduate Major and Graduation Date: Psychology, May 2020

Home Institution Mentor: Deanna Barch

Science Interests: I enjoy studying the neural correlates of psychopathology.

Career Goals: My goal is to become a clinical psychologist at an academic medical center.

Mariel Kristine B. Micael

Pronouns: She/her

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Home Institution: University of California San Diego

Academic Level: Junior

Undergraduate Major and Graduation Date: Cognitive and Behavioral Neuroscience, June 2023

Home Institution Mentors: Brenda Bloodgood, Terry Gaasterland, Ashley Juavinett, and Eduardo Macagno

Science Interests: The part of neuroscience that excites me the most is pursuing interesting questions about the brain with other curious people, particularly questions that help to uncover the mechanisms behind neurodegenerative disorders.

Career Goals: My goals are to obtain my bachelor's, Ph.D., and eventually work as a research scientist studying Alzheimer's disease.

Nylah Miles

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Home Institution: Temple University

Academic Level: Junior

Undergraduate Major and Graduation Date: Neuroscience, May 2023

Home Institution Mentor: Lisa Briand

Science Interests: The most exciting part of neuroscience is that we are constantly learning new things

about the brain every day. I love that scientists are all collectively working towards a common goal in our own ways.

Career Goals: My goal is to complete my Ph.D. and eventually have a few publications. Then, I want to move into getting a teaching certificate to become a professor at a university with my own lab.

Maxwell Miyasato

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Home Institution: University of Nevada, Reno

Academic Level: Junior

Undergraduate Major and Graduation Date: Chemistry and Neuroscience, December 2024

Home Institution Mentor: Mariann Weierich

Science Interests: I am interested in the molecular mechanism by which pharmacological treatments affect psychopathological disorders including post-traumatic stress and bipolar disorders. This summer, I studied the structure of one important potassium channel protein (TREK-1) that is responsible for creating a resting membrane potential and is a target for many therapeutics, such as anti-depressants, anti-anxiety medication, and general anesthetics.

Career Goals: After college, I want to pursue a Ph.D. in neuroscience or neuropharmacology. Eventually, I would like to be a professor at a research university, where I study the effects of pharmaceutical drugs on the brain, and how they work to alleviate psychological disorders.

Abna Moalin

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Home Institution: Highline College

Academic Level: Sophomore

Undergraduate Major: Biology

Home Institution Mentors: Tanvi Deora and Katie Stanchak

Science Interests: Neuroscience excites me because of how much there is left to learn. My love for the field started when I learned how our brains are what make us who we are. Our emotions, behavior, thoughts, dreams, and even motor controls are all made possible by this beautiful system. As I learned more in my studies, my love only deepened with its complexities and how much of a mystery things still are.

Career Goals: My career goals are to be working on neurological disease treatments or fetal brain development research. I don't know if I want to work in a more clinical or research-based setting, but I am open to a lot of different paths!

Kayla Moehn

Pronouns: She/her

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Home Institution: New Mexico State University

Academic Level: Junior

Undergraduate Major and Graduation Date: Genetics and Biotechnology; Philosophy, December 2022

Home Institution Mentor: Timothy Wright

Science Interests: Like many budding neuroscientists, I am interested in understanding consciousness and how molecules can impact the conscious experience. Additionally, I am interested in the relationship between genetics, the environment, and behavior. I also think that the ethical implications of neuroscience are very interesting!

Career Goals: I am unsure about my specific career goals. Studying the ethics and practical applications of science excites me, so perhaps I might want to get involved in the policy-making side of science. Still, research itself, along with teaching, also excite me, so I'm not entirely sure what I want to do yet.

Atheer Musad

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Home Institution: Brooklyn College

Academic Level: Junior

Undergraduate Major and Graduation Date: Psychology, 2023

Science Interests: I have always wondered and thought about mental and psychological disorders and how these disorders can develop. I've spent a lot of time realizing how science could advance in the treatment of mental and neurological disorders. From a young age, my interest was in mental disorders and the factors that cause them in general. Therefore, neuroscience was one of the most important sciences that caught my attention because it is correlated with the mind and mental disorders. Therefore, recognizing neuroscience and how it operates, and the functions of neuroscience, will assist me, scientists, and other students understand a lot about mental disorders, their development, and how to treat them. It is also our goal to develop more effective treatments with fewer side-effects in treating and negotiating with mental disorders. Here is where my interest in neuroscience began and it is still expanding more and more with the knowledge and discovery of this world that contains a lot of learning and sciences related to neuroscience.

Career Goals: My professional goal is to work in the field of psychiatry and neuroscience with the other corresponding areas such as chemistry, genetics and environment. My main goal is to conduct research on mental disorders in general and to understand how to develop more effective treatments that can reduce side effects as well as treat the diseases from their roots. There are a lot of psychological and neurological mysteries about disorders, so my goal is to understand and research these disorders.

Danh Ngoc Nguyen

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Home Institution: University of Washington

Academic Level: Junior

Undergraduate Major: Biochemistry

Home Institution Mentor: Jenny Taylor

Science Interests: What excites me most about neuroscience is learning how nervous systems transport information. Moreover, I am interested in exploring the connection between our human brain, human behavior, and pharmacology.

Career Goals: My goal is to earn a Ph.D. in pharmacy at the University of Washington in Seattle.

Amajindi Nwankpa Jr.

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Home Institution: New York University

Academic Level: Senior

Graduation Date: Neuroscience, 2022

Home Institution Mentors: Marc Gershow and Paul McNulty

Science Interests: Our hopes, fears, dreams, and vices can all be attributed to neuronal activity. We marvel at paintings and we gasp at sunsets. We feel joy at the sign of a loved one's smile. The way our neurons process this information is amazing. When we enter a room, we saccade, redirecting our fovea while we look for salient information. Neurons (possibly in V4) go to work engaging in mechanisms for saccadic suppression. Visual information flies through ocular dominance columns before being beautifully displayed in retinotopic maps in the visual cortex. The most extravagant artificial intelligence, such as convolutional neural networks (CNNs), fail to truly replicate this masterpiece.

Career Goals: I aspire to become a Clinical Research Physician. This will give me the opportunity to look for ways to improve medical care. Obtaining an M.D./Ph.D. will help me in these aspirations. The program will allow me to learn proper clinical techniques as well as develop my understanding of proper research protocol. At this point, I have many interests. Obtaining an M.D./Ph.D. will also give me the opportunity to explore a wider range of those interest.

Beverly Obodaifio

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Home Institution: University of Maryland, College Park

Academic Level: Junior

Undergraduate Major and Graduation Date: Psychology, May 2023

Science Interests: I love that neuroscience provides the ability to combine the social and behavioral aspects of psychology with the biological aspects of various sciences. I am most interested in the way there are so many fields within the field of neuroscience. The ability to combine various other studies such as pharmacology or chemistry with neuroscience really excites me when I think of all the possibilities.

Career Goals: In the future, I want to be a physician-scientist. I want to have the ability and training to do

research and be able to actively apply findings in the medical field. I would love to do neuropharmacological research as well as do more research on autism spectrum disorder. I want to be able to study the biological bases of behavior relating to genetics as well as the social and behavioral outcomes of them.

Angel Gabriel Ojeda Hernaiz

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Home Institution: University of Puerto Rico at Cayey

Academic Level: Senior

Graduation Date: 2022

Home Institution Mentor: Robert Ross

Science Interests: My main focus in neuroscience is studying how the human body responds to different environmental toxicants and how exogenous treatments can affect these responses. I am most interested in the anatomy and physiology behind the heart and how it is connected to the nervous system.

Career Goals: The world of science has much to offer. I will continue doing research and exploring different areas of the Ph.D. after graduation. For now, I am looking forward to a combined M.D./Ph.D. program where I can be a scientific cardiologist who can integrate and/or relate the clinical background to my scientific research.

Geraldine M. Ortiz Sosa

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Home Institution: University of Puerto Rico at Cayey

Academic Level: Junior

Undergraduate Major and Graduation Date: Natural Sciences, 2023

Science Interests: What I find very exciting about neuroscience is most of all studying the correlations of the processes that happen in our brain that affect other parts of the body and our behavior. I find interesting as well the structure of the nervous system, and how everything works together.

Career Goals: One of my career goals is getting into medical school and eventually specializing in neurosurgery. Before and even after I graduate, I want to keep doing research to improve my skills and to learn about different scientific fields.

Beau Oster

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Home Institution: University of Nevada, Reno

Academic Level: Junior

Undergraduate Major and Graduation Date: Neuroscience, Spring 2023

Home Institution Mentor: Marian Berryhill

Science Interests: What excites me about neuroscience is the extent of the unknown. The nervous system is incredibly complex including the neurochemistry behind neurotransmission to the function of microglia and studying the basis of consciousness. Despite decades of neuroscience research, there are many unknowns. I am interested in how much there remains to study, and I am excited to have a future in neuroscience. The relationship between biology and psychology adds to the complexity of neuroscience, feeding my interest in the field.

Career Goals: I am currently a third-year undergraduate student at the University of Nevada, Reno studying neuroscience with a minor in ethics. After graduating with my B.S. in neuroscience (2023), I plan to apply to M.D./Ph.D. programs. My experience at the University of California Berkeley this summer confirmed my desire to pursue a research career. I want to combine medical knowledge and disease pathology with research experience to become an effective Physician Neuroscientist. I am particularly interested in pathological aging with β amyloid, tau, and cognitive changes.

Ephraim Oyetunji

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Home Institution: Washington University in St. Louis

Academic Level: Junior

Undergraduate Major and Graduation Date: Neurobiology, May 2023

Home Institution Mentors: Joan Downey, Erik Herzog, Diana José-Edwards, Timothy Miller, and Kathleen Schoch

Science Interests: I am most excited by the underlying biological mechanisms in neurodegenerative diseases like Alzheimer's disease and Parkinson's disease. It amazes me how the brain governs the essence of who we are and that such diseases can strip us of ourselves. I hope to continue investigating these pathologies and discover new therapeutic targets as we work towards a cure.

Career Goals: After graduation, I hope to become both a medical researcher and a practicing neurologist or neurosurgeon with either an M.D. or M.D./Ph.D. I want to be at the forefront of improving patient care through translational research to further my impact.

Darwing S. Padilla-Rolón

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Home Institution: University of Puerto Rico at Cayey

Academic Level: Senior

Graduation Date: June 2022

Science Interests: As an aspiring neuroimmunologist, what excites me about neuroscience is the potential this field has to be multidisciplinary. It is incredible how the nervous system communicates and interacts

with systems of our body and ends up with various consequences if not functioning appropriately. What is amazing to me is how we use our brain to learn and advance knowledge of the brain. Most importantly, what most excites me about neuroscience is that, independently of what you end up doing in this field, you are contributing new concepts to unknown knowledge and sharing solutions to the understanding of the nervous system.

Career Goals: I am still considering between a Ph.D. or an M.D./Ph.D., but what I am sure about is that after a year-long experience in a post-baccalaureate program, I intend to apply to graduate programs in neuroscience that would enhance my critical thinking skills in the emerging field of neuroimmunology/neuroinflammation in hopes of contributing to the knowledge of treatments of certain neurodegenerative and/or autoimmune diseases.

Luisa Mariann Paris Ramirez

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Home Institution: Interamerican University of Puerto Rico

Academic Level: Senior

Undergraduate Major and Graduation Date: Natural Sciences, May 2022

Home Institution Mentor: Mark W. Miller

Science Interests: What excites me most about neuroscience is how complex the nervous system could be and how it works with different and simultaneous processes.

Career Goals: I want to pursue Med School for an M.D./Ph.D.

Asia Parson

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Home Institution: Washington University in St. Louis

Academic Level: Senior

Undergraduate Major and Graduation Date: Psychology, May 2022

Home Institution Mentors: Michael Perino and Chad Sylvester

Science Interests: What excites me about neuroscience is that we can find a biological explanation for external and physical behavior and abilities. It's amazing how it is possibly to find causes for certain traits and abilities.

Career Goals: My career goals are to become a neuropsychologist. I would like to work with patients by diagnosing them and finding neurological causes for their behavior or abilities.

Ikponmwosa Pat-Osagie

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Home Institution: Hunter College

Academic Level: Senior

Undergraduate Major and Graduation Date: Psychology, December 2021

Home Institution Mentor: Chiye Aoki

Science Interests: Neuroscience gives me the opportunity to learn about how and why we do what we do.

Career Goals: After my undergraduate studies I plan on going to graduate school to get my Ph.D. in neuroscience. After graduate school, I hope to work at a variety of institutions conducting studies that help further what we know about the brain and how it corresponds to human behavior.

Blanca Perez

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Home Institution: Brown University

Academic Level: Junior

Undergraduate Major and Graduation Date: Neuroscience, May 2024

Home Institution Mentor: Carlos Aizenman

Science Interests: Neuroscience encapsulates so many sub-fields and the collaboration between these sub-fields makes the research all the more exciting. This is complemented by the vast amount of unknowns in neuroscience, which I believe anyone would find fascinating.

Career Goals: I'm interested in continuing in academia for the education, collaboration, and structure. In the last few years, I've learned from several different neuroscience fields and I hope to take those experiences with me through my Ph.D. and opportunities beyond it.

Caroline Perez

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Home Institution: Xavier University of Louisiana

Academic Level: Senior

Graduation Date: Fall 2022

Science Interests: Neuroscience interests me because of its far-reaching effects in the body. I am especially interested in the intersection between the nervous system and the endocrine system.

Career Goals: As of right now, I am unsure of what I'd like to do after graduate school. I am leaning towards continuing laboratory research rather than joining the corporate sector.

Marina P. Perez Gil

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Home Institution: University of Puerto Rico at Cayey

Academic Level: Senior

Undergraduate Major and Graduation Date: Biology, May 2022

Science Interests: My main interest in neuroscience is neuroendocrinology. I am fascinated by the interaction between the nervous system and the endocrine system, and how the brain regulates hormone activity within our body.

Career Goals: The goal of my professional career is to become a physician scientist (M.D./Ph.D.) with a focus in neurology, conducting research in more effective ways of elucidating the pathophysiology of certain neurological diseases that may not have long term therapies.

Kelsey Person

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Home Institution: University of Maryland, Baltimore County

Academic Level: Senior

Undergraduate Major and Graduation Date: Biological Sciences, May 2022

Home Institution Mentor: Tara LeGates

Science Interests: The interdisciplinary nature of neuroscience allows you to combine aspects from many different fields to study the brain. My research interests lie in understanding the neural circuits that regulate behavior.

Career Goals: After graduation, I plan to pursue a Ph.D. in neuroscience. I would like to continue working in research after obtaining my Ph.D.

Alexandra N. Ramirez

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Home Institution: University of Colorado Denver

Academic Level: Senior

Undergraduate Major and Graduation Date: Psychology, May 2022

Home Institution Mentor: Ethan Hughes

Science Interests: I am most excited about social and cognitive neuroscience. Specifically, I'm fascinated by the neuroanatomy and neural pathways that are involved in decision-making. Within social neuroscience, I am interested in moral and emotional decisions and how and why these are made. Aside from the neuroscience aspect of it, I am curious about other factors that may contribute to these decisions.

Career Goals: I plan to receive my Ph.D. in neuroscience and go into a position as both a principal investigator and professor.

Liatris Renee Reevey

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Home Institution: University of Washington

Academic Level: Junior

Undergraduate Major and Graduation Date: Neuroscience, 2022

Home Institution Mentors: Asad Beck and Horacio de la Iglesia

Science Interests: What interested me at first about neuroscience was, as someone with ADHD, learning about how much the brain and neurotransmitters affect behavior. The most exciting parts of neuroscience to me are behavior, consciousness, diseases, disorders, and neuroplasticity. The constant discoveries make neuroscience an endlessly interesting subject, and I want to be a part of that.

Career Goals: I want to get a Ph.D. in neuroscience and research disorders and diseases of the brain.

Wilma V. Richiez Mateo

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Home Institution: University of Puerto Rico at Bayamon

Academic Level: Junior

Undergraduate Major and Graduation Date: Human Biology, 2023

Science Interests: What excites me about neuroscience is its versatility. I'm specifically interested in studying cognition. The inter-connection between the philosophical, the physiological, and the emotional response to external stimuli is something I am very interested in researching. I am also very interested in further dwelling within the world of neuroplasticity, neurodegeneration, and learning processes, Thanks to my current research study, I am able to identify some issues that are directly linked to neural plasticity that I could not have imagined were related before. Therefore, I believe this field also needs further understanding.

Career Goals: My career goals are to finish my bachelor's degree while being able to participate in many extracurricular activities that involve student activism, student career development, research, and helping underprivileged communities. Overall, I want to be able to acquire my Ph.D. in a field around neuroscience, especially cognitive neuroscience. I would also like to be able to start an organization to help underprivileged communities be able to develop better careers in Latin American countries within STEM fields.

Shamauri Joshua Rivera

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Home Institution: Hunter College

Academic Level: Senior

Undergraduate Major and Graduation Date: Behavioral Neuroscience, Fall 2022

Home Institution Mentor: Sandeep Prasada

Science Interests: Neuroscience is such an exciting field because it allows the opportunity to study the source of all human creation, interpretation, and communication. The more we understand how our brain regulates our perception of the world around us, the more we will understand why humans have created the world around them and live within it the way they do. My personal interest lies within this domain, as I hope to explore how multiple interacting brains create the emergent properties that define groups (culture, behavior, etc.).

Career Goals: My career goal is to find and implement methods to improve group cooperation by understanding how each individual brain state contributes to the emergent properties of a group. I aim to do this by analyzing group interaction (specifically task-based cooperation) through multiple levels of analysis: from neurophysiology, behavior, and cognition. I will explore the use of artificial intelligence systems to help identify the potential consequences of certain brain states in individuals and their effect on the overall group. I hope to implement this research into high risk, specialized environments (e.g., Astronauts, Rapid Deployment Forces, expeditions, etc.).

Maria V. Rivera-Santana

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Home Institution: University of Puerto Rico, Mayagüez Campus

Academic Level: Senior

Undergraduate Major and Graduation Date: Biology, December 2021

Science Interests: The type of research I enjoy is focused on peripheral nerve injury and neurorehabilitation, particularly at the intersection between neuroscience, engineering, and surgery. Specifically, I would like to study either the mechanisms and physiology of peripheral nerve regeneration and/or help design potential interventions to help improve it. I am open to studying different types of peripheral nerve injuries, but have a particular inclination towards amputations and, as such, improving peripheral nerve surgical interventions post-amputation to create better interfaces of prosthetic control is something that I would potentially enjoy working on as a neuroscience or biomedical engineering Ph.D. student!

Career Goals: I plan on pursuing an M.D./Ph.D. dual degree. I am particularly interested in clinical and research areas related to peripheral nerves and neuroregeneration and would like to complement research in this field to clinical practice in plastic and reconstructive surgery, neurosurgery, or neurology. These are the specialties that intrigue me the most and which I would like to explore further.

Maximino Robles

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Home Institution: New Mexico State University

Academic Level: Senior

Undergraduate Major and Graduation Date: Computer Science, Fall 2021; Philosophy, Spring 2022

Home Institution Mentor: James Kroger

Science Interests: What excites me about neuroscience is that the brain is the most fundamental body part.

Career Goals: I aspire to be a university professor.

Oscar Romero

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Home Institution: Reed College

Academic Level: Senior

Graduation Date: May 2022

Science Interests: I am interested in developmental neuroscience. I am curious to learn how the brain changes over time and what factors contribute to those changes. I have interest in exploring developmental questions that regard glial cells, the cytoskeleton, cell migration, and cell signaling pathways.

Career Goals: I plan to attend graduate school to earn a Ph.D. degree in neuroscience in hopes that I will become a principal investigator who finds new discoveries.

Jesús Manuel Rosario-Claudio

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Home Institution: University of Puerto Rico at Cayey

Academic Level: Senior

Undergraduate Major and Graduation Date: Natural Science, 2022

Home Institution Mentor: Geoffroy Laumet

Science Interests: I like to think that the brain is like the ocean… we only know 5% of it and the more we study it the more answers we will find to questions we haven't been able to ask ourselves yet.

Career Goals: For as long as I can remember I have wanted to become a professional in the areas related to health and science. Originally, I dreamed of becoming a veterinarian, but in my small island of Puerto Rico, that possibility was almost nonexistent. First, if I wanted to study veterinarian medicine, I had to go out of the country and second, the employment opportunities are scarce. Then, I decided to shift my mindset into human medicine and become a doctor in medicine (M.D.). The areas in medicine that caught my attention were orthopedics, physiatrist, and sports medicine.

Jacob Ross

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Home Institution: University of California San Diego

Academic Level: Junior

Undergraduate Major and Graduation Date: Neurobiology, June 2023

Home Institution Mentor: Jon Dean

Science Interests: What excites me most about neuroscience is being on the very cutting edge of our understanding of how the brain works and having the chance to contribute to furthering our understanding via new discoveries in the lab every day.

Career Goals: My primary career goal is to contribute to neuroscience research that will help inform treatments for conditions that affect veterans returning from the field of battle.

Antonia Esmeralda Sajche Sapon

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Home Institution: University of California San Diego

Academic Level: Junior

Undergraduate Major and Graduation Date: Neurobiology, June 2023

Home Institution Mentors: Brenda Bloodgood, Terry Gaasterland, Ashley Juavinett, and Eduardo Macagno

Science Interests: When I was a child, I always thought people who were intelligent had "bigger brains". Throughout my journey, I realized it's actually all about the hard work and effort one puts in. The brain is fascinating to me because I want to focus on the neurons and cell types in the brain and signaling mechanisms that regulate the formation of blood brain barrier during development. Another neuroscience topic I am interested in is stem cells in young brain organoids.

Career Goals: My career goals are to follow the path of an M.D./Ph.D. dual degree, to then become a Medical Scientist, working myself up to become a Professor at the School of Medicine, and eventually I hope I can become Dean of the School of Medicine.

Karen San Agustin

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Home Institution: New York University

Academic Level: Senior

Undergraduate Major and Graduation Date: Neural Science, May 2022

Home Institution Mentors: Mauricio Oliveira and Prerana Shrestha

Science Interests: What excites me about neuroscience is the possibility to discover something new and to be part of the movement of scientists getting closer to understanding how the brain works.

Career Goals: My career goal is to continue digging deep into the processes that underly memories formation and retrieval at the academic level.

Krystal M. Santiago Colon

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Home Institution: University of Puerto Rico at Cayey

Academic Level: Senior

Undergraduate Major and Graduation Date: Biology, May 2022

Science Interests: Neuroscience is a dynamic field with a multidisciplinary nature that aims to overcome the challenges of studying the most complex system - the nervous system.

Career Goals: My ultimate goal is to further our understanding of the complexities of the nervous system. By applying to Ph.D. programs in neuroscience and pharmacology, I will receive the necessary training to lead a state-of-the-art research program to define the molecular pathways that directly alter functionality of neurons and to understand how these synergize in the brain to modulate behavioral outcomes. Understanding functionality will ultimately facilitate the development of therapies for neurological and psychiatric disorders. I aim to leverage the problem-solving approaches that neuroscience encompasses to translate basic research into accessible therapeutic interventions.

Koralee Santiago-Rivera

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Home Institution: University of Puerto Rico at Cayey

Academic Level: Senior

Undergraduate Major and Graduation Date: Natural Sciences, 2023

Home Institution Mentors: Rabail Khan and Gina Leinninger

Science Interests: What interests me the most about neuroscience is the combination of physiology and neuroscience. I got the opportunity to work in this specific area this summer and the complexity and relation with everything is amazing.

Career Goals: When I graduate, I would like to do a Ph.D. in anatomy with a minor in neuroscience or a Ph.D. in neuroscience.

Sabrina Santos-DeLeon

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Home Institution: University of Puerto Rico, Río Piedras Campus

Academic Level: Junior

Undergraduate Major and Graduation Date: Cellular Molecular Biology, 2023

Home Institution Mentor: Christian Bravo

Science Interests: Neuroscience for me is a field with ongoing need for discovery. The neuroscience field is in charge of discovering how and why individuals are like they are. I find every technique, every approach,

and every discovery as a big step towards how we are able to understand ourselves, to understand the world around us, and to understand what makes us, us.

Career Goals: I know I want to dedicate my life to the study of the brain. I am passionate about how circuits in the human brain are able to control each and every action and thought and how we are able to live. The study of the brain awakens all my passions and fulfills that creative side I constantly long for in everything I work on. I want to become a physician-scientist by enrolling and fulfilling an M.D./Ph.D. program.

Gabrielle Sheets

Pronouns: She/her

Email: gshee1@lsuhsc.edu

Home Institution: University of New Orleans

Academic Level: Junior

Undergraduate Major and Graduation Date: Psychology, 2023

Home Institution Mentor: Elliott Beaton

Science Interests: What excites me most about neuroscience is the variety of applications it has. Since the brain controls the entire body, there are a wide range of topics to choose from when beginning research.

Career Goals: After I complete my undergraduate degree, I would like to pursue an M.D./Ph.D. so that I may use research to help better the health of my community.

Jermaine Stokes

Pronouns: He/him

Email: js10397@nyu.edu

Home Institution: New York University

Academic Level: Senior

Undergraduate Major and Graduation Date: Biology, May 2022

Home Institution Mentor: Shira Baror

Science Interests: The thrill of finding new breakthroughs and information regarding the human brain, is by far what interests me most. I enjoy looking at the underpinnings of systems and reasoning why certain things work or not, and I feel that neuroscience explores a limitless system that allows me to do this: the brain and neural network. There are always valid questions requiring answers in this field, and the fact neuroscience is still not fully understood in many aspects, is what makes me most interested.

Career Goals: My career goals involve using my work both inside a clinical setting and research field, to understand the underpinnings of the human brain that deal with behavior-influencing diseases such as Alzheimer's, schizophrenia, and more. In doing so, I hope to use this understanding to provide substantially effective care to patients I see in practice, and further drive research to widely affect other people affected by these diseases.

Breanna K. Surface

Pronouns: She/her

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Home Institution: Tacoma Community College

Academic Level: Junior

Undergraduate Major and Graduation Date: Biology, June 2022

Science Interests: What has interested me the most about neuroscience is being able to understand the brain and how each area plays its role.

Career Goals: My career goals are to be able to work on projects that can help to prevent or treat people with various disabilities and to improve overall health and daily life.

Maria Tello Borja

Pronouns: She/her

Email: mmtello24@gmail.com

Home Institution: Washington University in St. Louis

Academic Level: Junior

Undergraduate Major and Graduation Date: Philosophy/Neuroscience/Psychology, May 2023

Home Institution Mentor: Tim Holy

Science Interests: Neuroscience provides a valuable and unique approach to uncovering truth: it surveys science by integrating multiple disciplines which complement each other.

Career Goals: My career goals are to pursue a neuroscience graduate school degree and conduct research at an academic institution.

Jennifer Tepan

Pronouns: She/her

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Home Institution: Hunter College

Academic Level: Senior

Undergraduate Major and Graduation Date: Psychology, May 2022

Home Institution Mentor: Jonathan Winawer

Science Interests: Neuroscience is interesting to me because there is a variety of topics to explore. As an undergraduate, it was interesting for me to learn in my courses that there are specific brain regions and lobes that are associated with certain physiological functions. This is why I am currently in a laboratory that uses fMRI so as to learn which regions of the brain allow for perception. I think mapping out regions of the brain and their functions like retinotopic mapping is interesting. Moreover, learning neuroscience at a cellular and molecular level was interesting to me because I was able to investigate which glial cells are present in a knockout model and how they are affected, or how the proliferation of cells lines is impacted by the addition of possible Alzheimer's symptom alleviating drugs. I think it is exciting that there is a variety

of questions that can be explored in neuroscience through the use of different methods.

Career Goals: In the future, I would like to pursue a graduate degree in psychology with an emphasis on neuroscience. I would also like to mentor others as a graduate student. I would also like to pursue industry.

Isaac Toscano

Pronouns: He/him

Email: itoscano@scu.edu

Home Institution: Santa Clara University

Academic Level: Junior

Undergraduate Major and Graduation Date: Neuroscience, June 2023

Home Institution Mentor: Laura Cocas

Science Interests: I am absolutely captivated by the mechanisms occurring at the cellular level and the impact of these interactions on neural health. It amazes me to learn about explanations of biological processes that may be studied at a micro level. These interactions, though microscopic, ultimately have cascading effects that may be tracked through different levels and systems within an organism.

Career Goals: I plan to merge my passion of neuroscience and business to start a company whose mission is to advance neural health. Utilizing my understanding of the brain, the ability to think like a scientist and understand scientific literature, along with knowledge of finance and entrepreneurship, I plan to apply this skillset to the business realm. I will join the corporate sector after acquiring a Ph.D., gain helpful experience, and then launch my personal business.

Sarah Uran

Pronouns: She/her

Email: suran@ucsd.edu

Home Institution: University of California San Diego

Academic Level: Junior

Undergraduate Major: Neurobiology

Science Interests: What excites me about neuroscience is the unknown. Knowing that with research I can stumble upon something that has never been discovered before that is currently happening in the human body excites me.

Career Goals: My goals are to receive an M.D. and Ph.D. I want to specialize in chronic conditions in a neuroscience approach.

Leeanne M. Vázquez-Ramí-rez

Pronouns: She/her

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Home Institution: University of Puerto Rico at Cayey

Academic Level: Senior

Undergraduate Major and Graduation Date: Biology, May 2022

Science Interests: What excites me the most about neuroscience is studying molecular mechanisms, behavioral and cognitive aspects of neurodevelopmental disorders, such as the autism spectrum disorder (ASD) and intellectual disabilities. In addition, I am interested in neuroendocrine sex-specific differences.

Career Goals: My career goals are to obtain a Ph.D. in neuroscience and a position in academia. As a senior student, I will now be applying to post-baccalaureate programs to gain more research experience in neuroscience in order to fulfill my plans of completing graduate studies in this field. In addition, with my previous volunteering experience in neuroscience outreach activities, I plan to keep incorporating these in my future schedules to serve as a nexus between science and the community.

Omaris Vélez-Acevedo

Pronouns: She/her

Email: omaris.velez@upr.edu

Home Institution: University of Puerto Rico, Río Piedras Campus

Academic Level: Senior

Undergraduate Major and Graduation Date: Cellular and Molecular Biology, 2023

Home Institution Mentors: José E. García-Arrarás, Carlos A. Jiménez-Rivera, and Carmen Maldonado-Vlaar

Science Interests: Being such an interdisciplinary field, it's exciting for me to think about all the possibilities of research I can pursue when it comes to something as interesting and intricate as the nervous system. I am also passionate about destigmatizing mental health disorders, so getting to understand their impact at different levels of analysis in neuroscience helps me contribute to my community by being able to share my knowledge and normalize conversations surrounding mental health.

Career Goals: I plan to pursue a Ph.D. in neuroscience where I can conduct research on substance-use disorder. Furthermore, throughout my career, I would like to contribute to a better understanding of this disorder through my research while also being able to educate others on the stigmatization surrounding it through public outreach and advocacy.

Sandy Vang

Pronouns: She/her

Email: sandy.vang@ucdenver.edu

Home Institution: University of Colorado Denver

Academic Level: Senior

Undergraduate Major and Graduation Date: Psychology, May 2022

Home Institution Mentors: Sondra Bland and Jeremiah Ramos

Science Interests: I am most excited by neurobiology and behavioral neuroscience, specifically how these two subfields are used to investigate underlying mechanisms of systems that are not yet known.

Career Goals: After I graduate, I plan on applying to a Ph.D. program that centers on behavioral neuroscience. I hope to obtain the skills necessary to interpret circuits underlying sex-specific differences regarding sexual behavior. My goal is to understand how these sexual behavior circuits overlap with other

known circuits such as anxiety and depression and investigate how these circuits can work together to improve the quality of life.

Anthony Villegas

Pronouns: He/him

Email: anthony.villegas29@myhunter.cuny.edu

Home Institution: Hunter College

Academic Level: Senior

Undergraduate Major and Graduation Date: Psychology/Biological Sciences, May 2022

Home Institution Mentor: Nesha S. Burghardt

Science Interests: I was drawn to neuroscience because I wanted to better understand the brain and how its circuits relate to behavior.

Career Goals: I plan on going to graduate school for my Ph.D. in neuroscience after Hunter. Down the road, I'd like to work in a clinical setting and run my own lab one day.

Zixian Wang

Pronouns: She/her

Email: zixian.wang74@myhunter.cuny.edu

Home Institution: Hunter College

Academic Level: Senior

Graduation Date: Spring 2022

Home Institution Mentor: Carmen Vasquez-Melendez

Science Interests: The brain contains a micro-version of the world we are living in - a complex black box that analyzes all the information we receive daily. All behaviors, senses, and responses we have can be trace back to the brain. There is a lot of unsolved mysteries within it which drive me to discover more.

Career Goals: I'm interested in learning, teaching, and doing research. After graduated from Hunter College, I want to apply for graduate programs related to behavioral neuroscience, biophysics neuroscience and bioengineering neuroscience. I want to continue my future career in academics and support future generation of students.

Julián David Welsh

Pronouns: He/him

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Home Institution: New Mexico State University

Academic Level: Graduate student

Undergraduate Major: Psychology

Home Institution Mentor: Michael Hout

Science Interests: What excites me about neuroscience is how neurological function affects cognition and behavior.

Career Goals: My goal is to become a clinical neuropsychologist.

KG Williams

Pronouns: They/them

Email: k.g.williams@wustl.edu

Home Institution: Washington University in St. Louis

Academic Level: Senior

Undergraduate Major and Graduation Date: Philosophy/Neuroscience/Psychology, 2022

Home Institution Mentor: Todd Braver

Science Interests: I am excited about learning how to design experiments from fundamental concepts and encountering new methods for approaching problems in neuroscience, especially utilizing computational methods for acquiring and analyzing data.

Career Goals: I intend to pursue an M.D./Ph.D. and use this training to contribute to translational neuroscience, namely for better understanding and treating psychiatric disorders, such as psychosis.

Matthew R. Wilson

Pronouns: He/him

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Home Institution: Xavier University of Louisiana

Academic Level: Junior

Undergraduate Major and Graduation Date: Neuroscience, Spring 2023

Science Interests: What excites me about neuroscience is brain-computer interfaces.

Career Goals: My goal is to become a physician-scientist.

Justin Woods

Pronouns: He/him

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Home Institution: Washington University in St. Louis

Academic Level: Junior

Undergraduate Major and Graduation Date: Cognitive Neuroscience, May 2023

Home Institution Mentor: Eric Herzog

Science Interests: What excites me about neuroscience is understanding the correlation between neural circuitry and metabolic abnormalities that lead to diseases such as diabetes.

Career Goals: My career interests lie in working in internal medicine; I wish to tackle healthcare issues as a physician in communities with poor health outcomes by bolstering preventative care measures and

increasing medical literacy.

Hanan Yafai

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Home Institution: Brooklyn College

Academic Level: Junior

Undergraduate Major and Graduation Date: Psychology with minor in Neuroscience, June 2023

Science Interests: What excites me and interests me about neuroscience is that its bounds are limitless; it allows me to incorporate my knowledge in chemistry, biology, and even psychology and apply it to the human brain the most complex machinery in the universe!

Career Goals: My career goal after obtaining my Ph.D. in neuroscience is to become a neurologist.

POSTER SESSION SCHEDULE

Group A | Oct. 19, 2021 | 3:30 – 4:00 p.m. ET

#	RESEARCH PROJECT TITLE	NAME
1	Role of Neurotensin Receptor-1 Expression in Dopamine Neurons for Feeding, Locomotor and Anxiety Behaviors	Sydney K. Arriaga
2	Quantification and transcriptional features of meningeal B cell clusters in a murine model of multiple sclerosis	Alexandra Martinez Lopez
3	Role of Neurotensin Receptor-2 Expressing Cells in the Ventral Tegmental Area on Body Weight	Koralee Santiago-Rivera
4	Analyzing Behavioral Flexibility During A Strategy Switching Task in Rats	Trinity Charles
5	Rescuing stress induced anxiety in a mouse model of tuberous sclerosis complex	Karen San Agustin
6	Effects of scene familiarity and similarity on eye movements	Zixian Wang
7	Microglia Heterogeneity in Mice Aging and Parabiosis Model by Single-Cell RNA Sequencing	Oscar Romero
8	Mechanical Sensor Distribution on Hawkmoth	Abna Moalin
9	How Astrocytes May Contribute to the Formation of Sighs	Skyler Hidalgo-Andrade
10	Impact of LXR Agonist on Amyloid Pathology in Trem2-/- Mice with Amyloid-b Amyloidosis	Caroline Lewis
11	The transcription factor VAX1 is Required for Suprachiasmatic Nucleus Circadian Output and estrous cyclicity in Female Mice	Fabiola Ramos
12	A size-invariant model for studying direct neurotization of vascularized muscle grafts: Does reinnervated muscle size affect function and viability?	Maria V. Rivera-Santana
13	The role of central neurotensin signaling in pain	Krystal M. Santiago Colon
14	Reward seeking during punishment risk in naloxone-precipitated fentanyl withdrawal	Justin Woods
15	Stage setup for in vivo neuroimaging of anesthetized mice using inverted STED super resolution microscopy	Julià̀n David Welsh

16	Hypertension in male and female SHR/SP rats is associated with increased corticosteroid production	Angel G. Ojeda Hernaiz
17	Establishing a histological and physiological model of ventricular pathologies in zebrafish	Eboni Monae Arnold
18	Arousal, behavior, and their impacts on memory	Fatema Kitabwalla
19	Role of oxytocin receptors in the sex-specific regulation of social behavior in juvenile rats in the posterodorsal medial amygdala (MePD)	Leeanne M. Vázquez-Ramírez
20	Immunohistochemical analysis of endogenous α-synuclein in the mouse myenteric plexus	Marina P. Perez Gil
21	Activation of the Ventral Subiculum Decreases Open Field Exploration in Mice	Jermaine Stokes
22	Effect of optogenetic inhibition of the dopaminergic projection from ventral tegmental area to the nucleus accumbens on sign-tracking behavior in rats	Naru Kang
23	Triggering eye movements in mice to understand stable visual perception	Maximino Robles
24	Understanding Hox gene regulation in response to Wnt signaling during motor neuron differentiation	Natalya Krutovska
25	Quantitative Evaluation of Microglia Number and Density in the Nucleus Accumbens after Social Defeat Stress in Male and Female CX3CR1-GFP Mice	Rebeca Fuquen
26	Risky decision-making in preschool age children with and without neonatal opioid exposure	Nancy Kent Collie-Beard
27	Validating a novel rat pain scale built with high-speed imaging, dimensionality reduction and machine learning	Mariyah Jiwanji
28	Role of CSPG5 in developmental myelination	Zoe Abeyta
29	The Effects of Prenatal Exposure to Curcumin on Anxiety-Like Behavior in the Open Field Test in Mice	Anthony Villegas
30	High Pulse Energy, Low Damage: Optimizing 3-photon excitation for longitudinal in vivo imaging of mouse cortical gray and white matter	Alexandra N. Ramirez
31	Anatomical Characterization of Neuronal Subtypes in the Auditory Thalamus	Ian Alberto Díaz Nieves
32	Regulation of the acute stress response by oral contraceptive hormones	Ikponmwosa Pat-Osagie

Group B | Oct. 19, 2021 | 4:00 – 4:30 p.m. ET

#	RESEARCH PROJECT TITLE	NAME
1	The role of oxytocin receptors in the sex-specific regulation of social behaviors	Daniela Anderson
2	The role of Engulfment Receptor, Jedi-1 in oligodendrocyte lineage cell development.	Jennifer Tepan
3	The Structural Determination of TREK-1 in Lipid Nanodiscs by Cryogenic Electron Microscopy	Maxwell Miyasato
4	The loss of TSPO and AhR affects the expression of RNA in the mitochondria	Edwin Laboy Torres
5	A Test Towards the Integration of Sniffing and Spatial Navigation in Mice: Evaluating a Topographical Model of Olfaction	Maria Tello Borja
6	Cellular and molecular analysis of DNMT3A mutations associated with intellectual disabilities and growth disorders.	Devin Madison Burris
7	Investigating the role of Neuromedin S in morphine behaviors	Milagros Alday
8	Role of orexin in amyloid-b peptide production	Isaac Toscano
9	The ventral pallidum constitutes the main inhibitory projection to the ventromedial subthalamic nucleus	Kelsey Person
10	Foveal Appearance in Saccade Preparation	Oumayma Agdali
11	Predicting Alzheimer's Disease with quantitative cortical thickness models	Beau Oster
12	How sex and dominance interact with social position to affect prosocial behaviors in marmosets (Callithrix jacchus)	Shamauri Joshua Rivera
13	Characterizing reward seeking behavior and neural activity in the mesolimbic dopamine system	Breanna K Surface
14	Sex Differences in Median Eminence Mast Cells During Hypothalamic-Pituitary-Adrenal Axis Stress Response	Geraldine M. Ortiz Sosa
15	Is Respiratory Sinus Arrhythmia a Marker for Stress and Anxiety During a Stressor?	Milana Khaitova
16	Post-weaning social isolation alters sociability in male mice but not female mice.	Nylah Miles

17	Quantifying the effects of saccadic eye movements on visual responses and receptive field measurements in V1 of the awake mouse.	Amajindi Nwankpa Jr
18	Brain activity during spontaneous behaviors	Miguel Martinez
19	Predicting Epileptic Activity in Mouse Models using Artificial Intelligence	Liatris Renee Reevey
20	Role of microvillous cells in the olfactory epithelium in response to viral infection investigated through optogenetic stimulation	Sandy Vang
21	Antisense Oligonucleotide-mediated TREM2 Reduction in Tauopathy Mice Regionally Alters Phosphorylated Tau in the Absence of Microglia Activation	Ephraim Oyetunji
22	The effects of selective inhibition of orexinergic projections from the lateral hypothalamus to the paraventricular nucleus of the thalamus on cue- and food-motivated behavior	Beatriz de la Rea
23	AAV-PHP.eB Infectivity throughout different mouse lines	Andrea Viviana Abanto
24	The Effect of Methotrexate Treatment on Neuroinflammation Gene Expression in Pediatric Cancer Patients	Gabrielle Sheets
25	Neuroinflammation in the brain and association to stress exposure	Beverly Obodaifio
26	Investigating the Effects of Vaping and Nicotine's Block of Kir2.1 on Humerus and Digital Development in Embryonic Mice	Kayla Moehn
27	A motor protein contributes to 3D genome organization	Danh Nguyen
28	Regulation of inflammation by sensory neurons	Jesús Manuel Rosario Claudio
29	Enteric Glial Cells Modulate Neutrophil Infiltration in the Gastrointestinal Tract in Ulcerative Colitis	Darwing S. Padilla Rolón
30	Relationship between Neighborhood Poverty and Externalizing Symptoms in Children: Mediation and Moderation by Environmental Factors and Brain Structure	Megan Maxwell
31	Chronic topical applications of beta-caryophyllene but not cannabidiol, non-psychoactive cannabis constituents, induces contact dermatitis in mice	Citlalli Tomas Baltazar

POSTER ABSTRACTS

Andrea Viviana Abanto

Research Experience Institution: University of Washington

Research Mentor: Horacio de la Iglesia

Project Title: AAV-PHP.eB Infectivity throughout different mouse lines

Project Abstract: Whole brain analysis is a revolutionary integrative approach to effectively track activity in neuronal circuits. We aim to develop an improved and versatile genetic tool to aid in research studies involving analysis of neural activity using the Adeno Associated virus PHP.eB. Previous studies have shown that the engineered AAV-PHP.eB is an efficacious gene delivery option due to its effective transduction across the nervous system but it has only proved to be effective on c57 mice. Our goal is to test PHP.eB infectivity throughout three different mouse lines: c57, cd1 and a hybrid since we mostly conduct our research using hybrid mouse. Mice were administered with a modified nuclear localization signal tag packaged in AAV-PHP.eB through a retro-orbital injection. Their brains were sliced and imaged 3 weeks later. To quantify the neural infectivity of the virus, we used QuPath, a software that facilitates cell segmentation. Next, we employed SMART (Semi Manual Alignment to Reference Templates) to take our nuclear localization cell counts and register the counts to specific brain regions synchronized to the mouse Allen Brain Atlas. The knowledge gained from the results will help us to develop a better way to have efficient infectivity and pioneer new therapeutic approaches to maladaptive aggression in the future.

Zoe Abeyta

Research Experience Institution: University of Colorado Anschutz Medical Campus

Research Mentor: Bruce Appel

Project Title: Role of CSPG5 in developmental myelination

Project Abstract: In the central nervous system (CNS), oligodendrocytes (OLs) produce myelin, an insulating sheath that increases the speed of signals transmitted along neurons. Between these cells is the extracellular matrix (ECM) which provides physical support and localized signaling. Chondroitin sulfate proteoglycans (CSPGs) are an ECM component known for cell adhesion and growth, receptor binding, or cell migration. CSPG5 is exclusively expressed in the CNS by OLs at a high-level during development. Previous studies show CSPG5 in areas of the brain associated with high plasticity and myelination, and we hypothesized that OLC-specific CSPG5 expression promotes developmental myelination. We first needed to discern which cells expressed CSPG5, so fluorescent RNA in situ hybridization was used to identify the cell types expressing CSPG5 in vivo. This was done on fixed zebrafish spine sections five days post fertilization (dpf). Our observations identified CSPG5 expressed with sox10 and mbpa. Our data reveal 67% of OLCs (sox10) expressed CSPG5. We plan to use transgenesis and CRISPR/Cas9-mediated genome modification to create endogenous fusion proteins to locate protein products.

Arie L. Aelmore

Research Experience Institution: University of Washington

Research Mentors: Eric Peterman and Jeff Rasmussen

Project Title: Dynamic responses of skin cells to somatosensory axon degeneration

Project Abstract: The somatosensory system is the system in our bodies responsible for peripheral touch and pain reception. It is complex and important to understand due to the many conditions that can cause peripheral nerve degeneration, where axons can lose myelination and degenerate. Many of the conditions we're looking into are peripheral neuropathy caused by diabetes and chemotherapy treatment. In our early studies we realized the unique dynamics of Langerhans cells in the epidermis, specifically how they seem to be the primary immune cells responsible for cleaning up cellular debris in the epidermis. Our goal is to better understand the function of Langerhans cells in the epidermis, using zebrafish as an in vitro model. We used the scales from transgenic zebrafish with fluorescent markers and confocal imaged the epidermis on the scales. We administered a non-muscle myosin (NMII) inhibitor, specifically para-amino- blebbistatin (AmBleb) to the scales an hour into, five hours of imaging. We then measured the protrusion length over time and quantified the results. Our findings suggest that inhibition of NMII in Langerhans cells causes the protrusions to remain in a protruded position for an extended period of time, although this effect is not long lasting. By studying the effect myosin inhibition has on the protrusions of langerhans cells we can better understand how they clean up cell debris, which may relate to peripheral neuropathy. In the future we're hoping to run more trials and collect more data to analyze, hopefully leading to discoveries about the cytoskeletal underpinnings of Langerhans cell function.

Uchechukwu Agali

Research Experience Institution: Washington University in St. Louis

Research Mentors: Rachel Lean and Cynthia Rogers

Project Title: The Effects of Socioeconomic Status on Anxiety Symptoms and Brain Region Volumes in Preterm Children at Age 9/10

Project Abstract: To examine how measures of neighborhood and family poverty and 9/10 regional brain volumes contribute to increased risk anxiety symptoms for children born very preterm (VPT, born <30 weeks gestational age). At age 9/10 years, 110 children came back for a developmental assessment (VPT=74, FT=36). Children underwent a structural MRI scan to measure hippocampus, insula, and amygdala volumes. The six assessment measures used to calculate anxiety outcomes were the Screen for Child Anxiety Related Disorders (SCARED), Schedule for Affective Disorders and Schizophrenia for School-Aged Children (KSADS) Ratings, Child Behavior Checklist (CBCL), Brief Problem Monitor for Ages 6-18-Youth (BPM-Y), Teacher's Report Form (TRF), Multidimensional Peer-Victimization Scale (MPVS). Area Disadvantage Index (ADI) was used to measure neighborhood disadvantage and income-to-needs ratio (INR) assessed family income. VPT and FT children with similar ADI and INR were recruited. VPT children had higher BPM-Y Internalizing and MPVS Physical Victimization with preterms having a higher mean compared to full terms. ADI and INR were significantly with the left amygdala with a positive correlation. ADI at birth and 5 years and INR at all time points were correlated to the right amygdala with a positive correlation. ADI and INR were both significantly related or close to significantly correlated SCARED School Avoidance, TRF Academic Performance, and MPVS Verbal Victimization. The right hippocampus was significantly associated with or close to significantly associated with the SCARED School Avoidance and the CBCL Internalizing Problems. Both right and left hippocampal volumes were all positively associated with the TRF Anxious/Depressed, the TRF Internalizing Problems, and TRF Anxiety Problems all with a positive correlation. All brain region volumes assessed correlated with at least one anxiety outcome. The CBCL Internalizing Problems was not statistically significant to prematurity or socioeconomic status but was significant to the right amygdala. Prematurity is significantly related to the left hippocampus and right

amygdala, with preterms having larger volumes of those regions compared to their full-term counterparts. The hippocampus, amygdala, and insula were also related to anxiety outcomes. Though prematurity is not related to ADI or INR due to the purposeful recruitment of ADI and INR between VPT and FT. Social disadvantage is associated with altered brain volumes and higher internalizing problems, but the amygdala appears to be particularly associated with internalizing problems. These results suggest prematurity may be a factor for the anxiety outcomes potentially affecting regional brain volumes known to be associated with anxiety.

Oumayma Agdali

Research Experience Institution: New York University

Research Mentor: Marisa Carrasco

Project Title: Foveal Appearance in Saccade Preparation

Project Abstract: Every waking second our eyes are bombarded with vast amounts of information about the environment around us. Attention allows us to filter this vast information and prioritize some aspects of information while ignoring others by focusing on a certain location or aspect of the visual scene (Carrasco 2011). Attention can make the same physical contrast of a stimulus appear higher when we attend to it (Carrasco, Ling, Read 2004). This effect can also be seen before your gaze has even reached this stimulus, but your attention has shifted to it (Carrasco 2011). Saccades, eye movements, are preceded by attention shifts. Pre-saccadic attention refers to the instance where the eye still rests at the saccade origin, however the attention has shifted to the saccade target (Deubel & Schneider 1996). Past studies have shown how pre-saccadic attention improves/ changes performance and appearance. Already during saccade preparation, the performance at the saccade target increases, which is reflected by participant's enhanced ability to correctly discriminate oriented test items (Rolfs & Carrasco 2012; Hanning, Deubel, Szinte 2019). While discrimination performance at the saccade target increases (Rolfs & Carrasco 2012), discrimination performance at the saccade origin decreases (Hanning & Deubel 2018). Moreover, it is known that pre-saccadic attention increases contrast perception at the saccade target: The contrast of a test item is judged higher when a saccade is prepared towards it (Rolfs & Carrasco, 2012). However, no studies have been done to show the effect pre-saccadic attention has on contrast perception at the saccade origin. Through using an eye movement task and measuring both performance and appearance at the saccade origin we test whether the increased contrast perception at the saccade target (Rolfs & Carrasco, 2012) is associated with decreased contrast perception at the saccade origin – similar to performance.

Milagros Alday

Research Experience Institution: Michigan State University

Research Mentors: Michelle Mazei-Robison and Cristina Rivera-Quiles

Project Title: Investigating the role of Neuromedin S in morphine behaviors

Project Abstract: The ventral tegmental area of the brain is responsible for behavioral reward which makes it important for understanding addiction for drugs of abuse. However, there is a heterogeneous population of neurons, specifically dopamine neurons, who's specific roles have yet to be described. Of interest to us are Neuromedin S (NMS) expressing neurons, whose expression is increased following chronic morphine in mice. We hypothesize that VTA NMS neurons play a role in morphine reward and addiction. To explore this, we placed viral vectors in the brains of mice to either activate or inhibit these NMS neurons. Then,

behavioral differences were observed when morphine injections were given for consecutive days alongside a control group whose VTA NMS neurons are not manipulated. We are tracking the differences of activity in the mice by measuring the change of ambulation counts each day that they are given the morphine injection. Once we finish with the behavioral assay, we then perform IHC to detect brain activity using c-fos as a marker. We will also do co-staining to determine the number of dopamine cells that are being activated. Furthermore, we will stain for the NMS receptor NMUR2 and determine if the nucleus accumbens, a brain region involved in the reward pathway, contains the necessary receptors to respond to an NMS signal from the VTA. Collectively, these data will provide cellular and behavioral-level understanding of the role of NMS VTA neurons in morphine behaviors.

Daniela Anderson

Research Experience Institution: Michigan State University

Research Mentors: Abigal Barrett and Alexa Veenema

Project Title: The role of oxytocin receptors in the sex-specific regulation of social behaviors

Project Abstract: The oxytocin receptor (Oxtr) system is a crucial component for the regulation of a broad range of social behaviors in males and females across a variety of species'. When studying brains from both sexes, sex differences in Oxtr binding density in brain regions implicated in the regulation of social behavior can be observed in both juvenile and adult rats. The ventromedial hypothalamus (VMH) is a brain region that is involved in the regulation of social behaviors in both sexes such as mating and social recognition. In the VMH, adult males have higher Oxtr binding density than adult females, while adult rats in general exhibit a higher Oxtr binding density than juvenile rats. However, there is no sex difference in the Oxtr binding density in the VMH of juvenile rats. We sought to determine whether cells that express Oxtr are recruited in a sex-specific manner following exposure to a social stimulus, specifically in the VMH. Adult and juvenile rats of both sexes were exposed to either a three-week-old sex-matched rat (social stimulus) for ten minutes or were left alone in their home cage (no social stimulus). Following this, rat brains were processed using fluorescent in situ hybridization which allowed us to examine Oxtr expression as well as fos activation (an immediate early gene used as a marker for neuronal activation) within the VMH. The acquired data will provide insight and strengthen our understanding of the role of the oxytocin receptor system in the sex-specific regulation of social behaviors.

Eboni Monae Arnold

Research Experience Institution: Washington University in St. Louis

Research Mentor: Gabe Haller

Project Title: Establishing a histological and physiological model of ventricular pathologies in zebrafish

Project Abstract: Interventricular hemorrhages (IVH) are an ongoing neonatal health concern, and over half of the cases of IVH lead to post-hemorrhagic hydrocephalus (PHH)[1,2]

Post-hemorrhagic hydrocephalus can cause a variety of neurological issues including psychological changes, seizures, poor development and learning disabilities. Hydrocephalus is the buildup of cerebral spinal fluid (CSF) due to flow disruption, preventing proper CSF circulation and removal of central nervous system waste[3]. Damage to neural tissue is irreversible, thus the need to develop an accurate model is a prerequisite in addressing treatment options for individuals with IVH and PHH. Zebrafish are predicted to be comparable to the mammalian ventricular system such that they can serve as an anatomical and

physiological model of ventricular pathologies. The first aim was to pinpoint what structure in the zebrafish is analogous to the mammalian arachnoid granulations responsible for the outflow of CSF[4]. Then to find if the ventricles are functionally similar, a recent study conducted on rats[5], which utilized iron chelators to reduce ventricular swelling from free radical iron in hemoglobin, was replicated using zebrafish instead. Images and measurements collected from this study support the physiological similarities between the zebrafish and mammalian model, but further investigation is required to understand histological comparability between these two model systems.

Sydney K. Arriaga

Research Experience Institution: Michigan State University

Research Mentors: Gina Leinninger and Jariel Ramirez-Virella

Project Title: Role of Neurotensin Receptor-1 Expression in Dopamine Neurons for Feeding, Locomotor and Anxiety Behaviors

Project Abstract: The dopamine (DA) system is essential for motivated feeding and locomotion, but disruption of this system is implicated in the development of obesity and low body weight, namely anorexia nervosa. All DA neurons transiently express the neurotensin receptor-1 (NtsR1) during development, suggesting that this receptor may contribute to the establishment and/or function of the DA system. Thus, we hypothesized that lacking NtsR1 expression in DA neurons impairs the function of the DA system and DA-dependent feeding, locomotor activity, and anxiety behaviors. To test this, we crossed DATCre/+ and NtsR1flox/flox mice to generate mice with intact NtsR1 (Controls - DAT+/+; NtsR1flox/flox) or mice in which NtsR1 was selectively deleted from DA neurons (DATCre/+; NtsR1flox/flox mice). We then assessed mice of each genotype and sex for feeding and physical activity, DA-dependent behaviors and body weight. Feeding and body weight were similar in Control mice and those lacking NtsR1 from DA neurons. However, mice lacking NtsR1 in DA neurons exhibited more locomotor activity than Control mice. This altered locomotor activity was not due to altered stress or anxiety like behaviors, nor differences in dopamine-dependent behaviors, as these were similar between Control and NtsR1-deficient mice. Thus, in contrast to our hypothesis, developmental deletion of NtsR1 deletion from dopamine neurons does not disrupt regulation of body weight or behavior and is likely not a pathogenetic contributor to disordered body weight.

Citlalli Tomas Baltazar

Research Experience Institution: Lewis Katz School of Medicine at Temple University

Research Mentors: Saadet Inan and Sara Jane Ward

Project Title: Chronic topical applications of beta-caryophyllene but not cannabidiol, non-psychoactive cannabis constituents, induces contact dermatitis in mice

Project Abstract: Beta-caryophyllene (β-CP) and cannabidiol (CBD) are non-psychoactive constituents of cannabis that are used for treating certain conditions like pain and seizures. However, allergic reactions in agricultural workers have been reported. Concerns over occupational health hazards and people working in warehouses dedicated to cannabis products have been rising. The aim of this study is to assess whether chronic topical applications of β-CP and CBD would induce allergic contact dermatitis (ACD) in male Swiss-webster mice. Before any application of the compounds, mice were observed for an hour to assess baseline scratching. CBD (1-10 mg/ml), β-CP (1-10 mg/ml) or vehicle (acetone) were topically applied to the nape of the mice 2x/week for 5 weeks. Twenty-four hours following the second application weekly,

scratching bouts were counted for an hour. Additionally, mice were evaluated for development of dermatitis in the presence of hemorrhage and bleeding, oedema, excoriation and erosion, and dryness and xerosis. Baseline scratching bouts were similar in mice in different treatment groups. Topical chronic applications of β-CP at 10 mg/ml significantly increased scratching bouts and induced dermatitis in mice. Whereas chronic topical applications of vehicle, β-CP at 1 mg/ml, CBD at 1 mg/ml, and at 10 mg/ml did not induce dermatitis or scratching in mice. These results show that topical applications of β-CP at a high concentration causes contact dermatitis in mice. Our results indicate that β-CP might be responsible for the development of allergic reactions in cannabis users and workers in cannabis farms.

Daniela Bermudez

Research Experience Institution: Michigan State University

Research Mentors: Andrew Eagle and AJ Robison

Project Title: Activation of LEC-NAc neurons mediate cocaine reward behaviors

Project Abstract: Drug craving and seeking are critical components of drug addiction. Neurons in the lateral entorhinal cortex (LEC) are activated by cocaine craving and cocaine cues. The LEC also sends neuronal projections to the nucleus accumbens (NAc), a region associated with reward and motivation, and a major area implicated in drug addiction. However, little is known about this pathway of LEC-NAc neurons, specifically whether it mediates drug seeking behavior and drug reward. We found that the LEC-NAc pathway is also activated by acute cocaine administration in mice. We now seek to determine whether the LEC-NAc pathway is necessary for the rewarding effects of cocaine. We used innovative viral DREADD (Designer Receptors Exclusively Activated by Designer Drugs) technology to target the expression of inhibitory G-protein-coupled DREADD receptors onto LEC-NAc neurons in mice. This allowed us to use DREADD-specific ligands to inhibit this pathway and determine how this alters the rewarding effects of cocaine. Mice subsequently were trained on a cocaine conditioned place preference (CPP) task, which is a common behavioral model to test cocaine reward. The findings will indicate whether inhibition of the LEC-NAc neurons impairs cocaine reward. The results of this study will give us a causal assessment on whether this key pathway that is activated by drugs is also necessary for drug seeking behaviors.

Cassandra Blew

Research Experience Institution: University of Colorado Anschutz Medical Campus

Research Mentor: Curt Freed

Project Title: Investigating the Neuroprotective Effects of ERK Inhibitors on Tau Aggregates in Alzheimer's Disease

Project Abstract: The formation of tau tangles (caused by truncation and hyperphosphorylation of functional tau) in the brain is directly correlated to cognitive decline in people with Alzheimer's disease. Extracellular signal-regulated kinases (ERKs) are thought to expediate toxifying processes. In this study, two naturally derived ERK inhibitors (Magnolin, Astragaloside IV) were tested on hyperphosphorylated tau in hopes that they would exhibit neuroprotective effects. PrestoBlue Assays were conducted on control and experimental cell cultures to determine if cell viability was increased upon drug administration. Neither drug showed a significant neuroprotective effect, but ERK inhibitors appeared to induce cell proliferation in mutant tissue that overexpressed tau. This suggests that ERK inhibitors have an impact on tau tangles, but it may not be neuroprotective. ERK is broken down into substrates (ERK1/ERK2); inhibition of each

substrate would have to be independently studied to assess which substrate of tau protein has the most effect (if any) on aggregation.

Devin Madison Burris

Research Experience Institution: Washington University in St. Louis

Research Mentors: Diana Christian, Harrison Gabel, Erik Herzog, and Diana Jose-Edwards

Project Title: Cellular and molecular analysis of DNMT3A mutations associated with intellectual disabilities and growth disorders.

Project Abstract: During early development, *de novo* DNA methylation is deposited on the genome by DNA methyltransferases (DNMTs). Recent in vitro and in vivo results and clinical data suggest that the methyltransferase DNMT3A is critical to neuronal development and function. In the postnatal brain, DNMT3A catalyzes deposition of canonical methylation at CG dinucleotides and is required for neuronal-enriched methylation at CA dinucleotides. *DNMT3A* mutations have been identified in patients with Autism Spectrum Disorder (ASD), intellectual disability (ID), and opposing growth phenotypes. Tatton-Brown Rahman Syndrome (TBRS) is caused by mutations in *DNMT3A*, and is characterized by overgrowth (>2 SD height) and ID, and recently *DNMT3A* mutations have also been identified in patients with dwarfism and ID. These contradictory mutations are in the canonical PWWP domain of DNMT3A, a well-studied protein domain important for association with chromatin and proper cellular localization. However, the cellular and molecular impact of these disease mutations remains unknown. We assess the effects of dwarfism, ASD, and TBRS mutations on cellular localization and protein expression in Neuro2A cells using immunocytochemistry and western blotting. Our analysis and previous published work indicate that TBRS mutations within the PWWP domain show trends of localizing to the cytoplasm and being lowly expressed. However, dwarfism mutations and the TBRS mutation R301W are exceptions with nuclear localization and stable expression. Interestingly, these mutations are all tightly clustered around the H3 histone binding pocket. Our findings offer insight into understanding molecular disruptions that may be driving disparate disease phenotypes between these subsets of PWWP mutants.

Trinity Charles

Research Experience Institution: University of Washington

Research Mentors: Victoria Hones, Jesse Miles, and Sheri Mizumori

Project Title: Analyzing Behavioral Flexibility During A Strategy Switching Task in Rats

Project Abstract: Behavioral flexibility, defined as the ability to make behavioral adjustments when the external and/or internal conditions change, is a skill necessary for survival. This is exemplified in nature when an animal changes their path due to a predator's presence. This skill can be observed in laboratory settings in tasks that require animals to adapt their behavior to task contingency changes. We tested rats' ability to flexibly switch between strategies that required them to either turn a certain direction or go to a specific location for a food reward. Our results show that the rats learned to switch strategies but did not perform well on the task because it took them a long time to switch. Although the rats showed behavioral flexibility, their performance remained low, indicating accuracy was not a good metric of behavioral flexibility. Therefore, our paradigm was modified to require that rats get at least 8 out of the previous 10 trials correct before a strategy switch occurred. This allowed us to determine that the strategy was learned, and how long it took the rats to learn it. Data analysis will provide information about whether certain

switches were easier to make and if rats were able to continually have behavioral flexibility to complete the overall task. This analysis is important because the ability to have behavioral flexibility is not held by all. For example, people with mental disorders such as schizophrenia and depression struggle to adapt to changes in their surroundings. A better understanding of how behavioral flexibility manifests may result in new treatment strategies to help with these disorders.

Nancy Kent Collie-Beard

Research Experience Institution: Vanderbilt University

Research Mentors: Emilia Cardenas, Kathryn Humphreys, and Autumn Kujawa

Project Title: Risky decision-making in preschool age children with and without neonatal opioid exposure

Project Abstract: Despite the growing number of infants exposed to opioids during gestation, we have limited information about whether opioid exposure during this time has similar effects on the developing brain and behavior as found in adults with direct use. In order to explore the potential neurobiological consequences of prenatal opioid exposure, we recruited children (age M = 4.00, SD = 0.77) with (n=20) and without (n=18) reported prenatal opioid exposure to complete the Balloon Emotional Learning Task (BELT). The BELT is a risky decision-making task that allows for implicit learning of task parameters through a series of virtual balloons that can be inflated for points. Furthermore, the task provides the ability to examine how behaviors change across trials in response to feedback (e.g., ending the trial intentionally and earning points, "popping" the balloon and losing the points that could have been saved). We hypothesize that young children who were exposed to opioids during prenatal development may differ from non-exposed counterparts in terms of impulse control (i.e., more balloon explosions) and/or negative urgency (i.e., "saving" the balloons prematurely). This research will contribute to a broader characterization of the behaviors found in this at-risk population, furthering our understanding of how opioid exposure during this critical developmental period may have downstream effects. These results will provide information relevant to psychoeducation for those who care for children with opioid exposure and inform clinical interventions regarding specific types of maladaptive behaviors.

Makayla S De La Oliva

Research Experience Institution: University of Colorado Anschutz Medical Campus

Research Mentor: Linda Barlow

Project Title: Retinoic Signaling in the Mouse Circumvallate Taste Papilla

Project Abstract: Cancer patients have to deal with several side effects due to their treatments. One of these side effects is taste dysfunction or taste loss which occurs because cancer treatments target the taste cell renewal process. In order to increase their quality of life by trying to prevent this from happening, it is important to understand how taste cell renewal works. Because the retinoic acid signaling pathway plays a role in the development/maintenance of various tissues through proliferation and differentiation, a study was conducted in order to see if it also played a role in the maintenance of taste cell homeostasis. So, the first step in finding the answer to this would be to ask if the RA pathway is active in taste tissues and if it is, in what cell populations. My hypothesis was that the RA pathway would be active in all stages of taste bud cell renewal. The research project consisted of using immunostaining for β-galactosidase and specific type II and type III cell markers. Immunostaining was done on a RARE-LacZ mouse's Circumvallate Papilla. Then a confocal microscope was used for imaging of the tissues. Overall, my hypothesis was not

supported. RA signaling was found in type II and III cell populations as well as outside of those populations which could be precursors and/or type I support cells, however, it was not found in the progenitor cells. In the future, younger adult mice and different immunomarkers for type I and sweet type II cells could be used.

Beatriz de la Rea

Research Experience Institution: University of Michigan

Research Mentors: Shelly Flagel and Amanda Iglesias

Project Title: The effects of selective inhibition of orexinergic projections from the lateral hypothalamus to the paraventricular nucleus of the thalamus on cue- and food-motivated behavior

Project Abstract: An organism's survival is dependent on their ability to properly respond to cues in the environment. In rodents, individual differences in cue-motivated behaviors appear in a Pavlovian conditioned approach (PavCa) paradigm, wherein a discrete cue is followed by delivery of a food reward. Sign-trackers (STs), attribute excessive incentive motivational value to reward cues, which transforms the cues into attractive and desirable stimuli that can gain inordinate control and lead to maladaptive behavior. Goal-trackers (GTs) primarily attribute predictive value to reward cues. Prior work has implicated the paraventricular nucleus of the thalamus (PVT) as a neural hub responsible for mediating differences in Pavlovian incentive learning, and orexinergic projections from the lateral hypothalamus (LH) to the PVT seem to be important in this regard. Lesions of the LH decrease the propensity to attribute incentive motivational value to reward cues, and administration of orexin (OX) antagonists into the PVT reduces the incentive value of reward cues. We postulate that orexinergic projections from the LH relay the incentive value of reward cues to the PVT. To address this, we utilized transgenic OX-Cre Long Evans rats, which express Cre-recombinase in OX neurons. We selectively inhibited OX neurons projecting from the LH to the anterior PVT (aPVT) by infusing a retrograde Cre-dependent inhibitory (Gi) DREADD (Designer Receptors Exclusively Activated by Designer Drugs) into the aPVT and administering systemic clozapine-N-oxide (CNO, 5 mg/kg). Adult male and female OX-Cre rats were characterized as STs or GTs following 5 PavCA sessions. To determine if inhibition of OX neurons in the LH-aPVT affects the incentive value of a reward-cue, CNO or vehicle (VEH) was administered prior to a conditioned reinforcement task, where rats had to elicit an instrumental response for the lever-cue previously paired with reward. CNO-treated rats showed less responding for the lever-cue. To determine whether inhibition of OX neurons in the LH-aPVT had a general effect on motivated behavior and instrumental responding, CNO or VEH was administered prior to a fixed-ratio (FR) 1 task for food reward. Gi-DREADD activation did not appear to affect FR1 responding for small or large amounts of food reward. Thus, inhibition of OX neurons in the LH-aPVT diminishes the incentive motivational value of reward-cues, without affecting the valence of the reward itself. This orexinergic LH-aPVT pathway may therefore play a critical role in encoding the incentive value of reward-cues.

Ian Alberto Díaz Nieves

Research Experience Institution: University of Pennsylvania

Research Mentors: Maria N. Geffen and Solymar Rolón Martínez

Project Title: Anatomical Characterization of Neuronal Subtypes in the Auditory Thalamus

Project Abstract: Interactions between inhibitory and excitatory neurons shape how acoustic information is processed in the brain. The thalamic reticular nucleus (TRN) is a major source of inhibition to the thalamus. It is responsible for modulating interactions between the medial geniculate body (MGB) or auditory

thalamus and the auditory cortex (AC). The MGB is subdivided into three regions: ventral, dorsal, and medial. Meanwhile, the TRN is comprised two main subtypes of inhibitory neurons, parvalbumin (PV) and somatostatin (SOM). These neuron subtypes have been shown to modulate frequency-dependent responses and to differentially control adaptation in the AC, but it's still unknown if they possess a similar role differentiation in the TRN through its projections to MGB sub-regions. We hypothesize that PV and SOM neurons differentially project to distinct sub-regions of the MGB. We injected a Cre-dependent Adeno-associated virus directly into the TRN of transgenic PV-Cre and SOM-Cre mice. After transfection of the viral tracer, mice brains were collected and imaged with fluorescence microscopy. We found that PV neurons had synaptic targets mainly in the ventral area of the MGB; in addition, SOM neuronal subtypes were identified to project mostly to the medial and dorsal divisions. Our results show evidence for the existence of a novel anatomical structure of thalamic inhibitory neuron types and give strength to the idea that PV and SOM neurons play functionally distinct roles in orchestrating inhibition in the TRN.

Rebeca Fuquen

Research Experience Institution: University of Maryland, Baltimore Medical Center

Research Mentor: Mary Kay Lobo

Project Title: Quantitative Evaluation of Microglia Number and Density in the Nucleus Accumbens after Social Defeat Stress in Male and Female CX3CR1-GFP Mice

Project Abstract: The current leading cause of disability globally is major depressive disorder (MDD). Chronic stress increases risk of developing MDD. With its high relapse rates despite modern treatments, further investigation of potential factors causing MDD symptoms is an essential step to advancing public health. Chronic stress leads to dendritic atrophy in the nucleus accumbens (NAc), a brain region involved in reward and motivation. Activation of microglia, the brain's immune cells, may underlie this atrophy. In this study, the aim is to measure quantities of microglia populations in the NAc region of male and female mice, following either a 10-day chronic social defeat stress (CSDS) paradigm or a chronic witness defeat stress (CWDS) paradigm. Following either stress exposure, mice underwent a social interaction test to identify stress-susceptible and stress-resilient mice. Mice that spent more time avoiding socialization with novel mice were categorized as susceptible, while those that preferred to socialize with the novel mice were considered resilient. CSDS and CWDS mice were perfused in order to obtain 100 um brain slices from the NAc region along with the ventral tegmental area and prefrontal cortex, other regions involved in mood regulation. A confocal microscope was utilized to attain three-dimensional, 20x objective images of these regions. These were analyzed using the software IMARIS 8 and ImageJ to evaluate the number of microglia bodies present in each section. Future research aims to further explore microglia quantity, morphology, inhibition, or other aspects in relation to stress susceptibility and chronic stress to expand upon current levels of comprehension.

Skyler Hidalgo-Andrade

Research Experience Institution: Seattle Children's Research Institute

Research Mentors: Susan Ferguson, Jan-Marino Ramirez, and Liza Severs

Project Title: How Astrocytes May Contribute to the Formation of Sighs

Project Abstract: Breathing is generated in the ventral lateral medulla; inspiratory activity is produced by a network in this region called the preBötzinger Complex (preBötC). The preBötC is a cluster of interneurons

in the ventral respiratory group of the medulla of the brainstem that is essential for respiratory rhythm generation in mammals. A specific type of breathing we want to study are sighs. Sighs are physiologically important because they hold an important role in allowing the alveoli in our lungs that allow rapid gaseous exchange to reinflate. It is a reflex that is life-sustaining and essential for survival. Sighs are also a component in the expression and response of different emotions, such as sadness, relief, or to express feelings relating to love. Understanding how sighs are generated can help us to understand how other rhythms in the brain are coordinated. What we don't understand is how the preBötC can generate both normal inspiratory activity and sighing. But we hypothesize that sighs are being generated by connections between neurons and astrocytes through purinergic signaling. Astrocytes release ATP, which can stimulate neurons through binding to purinergic receptors (in this case, p2y1). Previous experiments have shown that purinergic signaling strongly modulates sighs in the preBötC. Astrocytes are a type of glial cell that are distinct in many ways; glia outnumber neurons in the central nervous system, maintain brain homeostasis, and neuronal metabolism. They are also known to be implicated in neurogenesis and synaptogenesis.

Mariyah Jiwanji

Research Experience Institution: Temple University

Research Mentors: Charlotte Bavley and Mathieu Wimmer

Project Title: Validating a novel rat pain scale built with high-speed imaging, dimensionality reduction and machine learning

Project Abstract: One of the hurdles to improving available treatments for chronic pain is the difficulty to precisely and accurately measure pain. Most preclinical models of pain rely on binary reflexive assays that could be improved. Our collaborators recently developed a mouse pain scale, by analyzing behaviors on a sub-second level through use of high-speed videography, statistical modeling, and machine learning. Here, we adapted this novel scale to rats. We used innocuous (i.e., cotton swab) and painful stimuli (i.e., pin pricks) to first validate the ability to distinguish touch- from pain-like responses. Using high-speed videograph to delineate paw kinematics and combining these measurements with face grimace assessments, we generated a single pain score that differentiated touch from pain-like responses reliably. Moreover, this novel pain scale and single pain score changed in response to morphine treatment, suggesting that this pain scale can detect morphine-derived antinociception. Interestingly, we also found that the most used stimuli to measure pain in rodents, von Frey hair filaments, are not painful to rats at baseline conditions and morphine did not change the touch like responses elicited by VFHs. This is important because prior research has focused on using VFHs as the main measurement of pain. In summary, this novel pain scale represents a potentially valuable tool to better measure pain; It measures six behavioral parameters on a sub-second scale that represent both the reflexive and affective elements of nociception and combines them into a single index to assess pain sensation and intensity in rats on a trial-by-trial basis.

Naru Kang

Research Experience Institution: University of Maryland School of Medicine

Research Mentors: Sam Bacharach and Donna Calu

Project Title: Effect of optogenetic inhibition of the dopaminergic projection from ventral tegmental area to the nucleus accumbens on sign-tracking behavior in rats

Project Abstract: Addiction is a disease characterized by aberrant appetitive motivation and resistance to negative consequences of substance use. In part, this aberrant motivation is drive by an enhanced incentive value of cues associated with drug use. Sign tracking, or the tendency to interact with a reward predictive cue, is predictive of motivation for drug and vulnerability to relapse. Understanding the mechanisms underlying this sign tracking could provide insight into understanding addiction vulnerability. The aim of the current study was to determine the role of the dopamine projection from VTA to the NAc in the incentive value of the reward paired cue in sign-tracking rats. To do this, we used optogenetic inhibition experiments. We injected haloRhodopsin into the VTA of TH:Cre rats and placed optical fibers in the NAc to allow for inhibition of dopaminergic terminals. We examined the effect of inhibiting dopaminergic terminals in the NAc both during the conditioned stimulus (CS) presentation period during one test session and during the intertrial interval (ITI) period during another test session. We found that neither inhibition of dopaminergic terminals during the CS nor during the ITI altered sign tracking behavior.

Milana Khaitova

Research Experience Institution: Hunter College

Research Mentor: Tracy A. Dennis-Tiwary

Project Title: Is Respiratory Sinus Arrhythmia a Marker for Stress and Anxiety During a Stressor?

Project Abstract: Anxiety disorders, the most common mental health diagnosis, are associated with dysregulation of the stress response. Suppression of respiratory sinus arrhythmia (RSA), an index of parasympathetic nervous system (PNS) activity, represents an adaptive physiological response to stress. Few studies, however, have investigated associations between RSA suppression measured during a standardized lab stressor and behavioral signs of anxiety. This study aims to examine these associations by measuring self-reported anxiety, RSA, and behavioral indices of anxiety during a standardized lab stressor, the Trier Social Stress Test (TSST). The TSST has been shown to increase cortisol levels and heart rate. Participants self-reported anxiety symptoms, then completed the TSST while electrocardiogram (ECG) was recorded. Anxious behaviors were coded from videotaped TSST observations. RSA suppression during stressor versus baseline was quantified from ECG, with more negative scores indicating greater suppression. We tested the hypothesis that individuals with high versus low anxiety severity will show reduced RSA suppression during the TSST, which in turn will predict increased frequency of anxious behaviors. Anxiety level, anxious behaviors during the TSST, and RSA during the TSST were not significantly correlated, all p's > .70. The moderation analysis using regression revealed a trend, $\Delta R^2 = .0461$, $F(1, 87) = 4.2191$, $p = .0430$, albeit in a direction opposite to that hypothesized: those reporting greater anxiety severity evidenced fewer TSST anxious behaviors when they showed *low* levels of RSA suppression. Findings highlight the need for additional examinations of associations between physiological and behavioral responses during a stressor among anxious individuals.

Fatema Kitabwalla

Research Experience Institution: Temple University

Research Mentors: Deepu Murty and Nick Ruiz

Project Title: Arousal, behavior, and their impacts on memory

Project Abstract: Emotional experiences tend to be recalled with much more sensory vividness than mundane experiences. The highly arousing nature of the experience is predicted to narrow the focus of

perceptual processing to only the most highly salient stimuli. Conversely, high levels of motivation are thought to broaden the scope of cognitive processing, leading to greater integration of information across an event. Previous work from our lab has found that freely exploring a highly threatening environment resulted in severely disrupted memory for the event overall, but an enhanced recall of perceptual details which varied as a function of arousal (i.e., heart rate). In a separate study, we imbued individuals with a sense of agency, which induced higher levels of motivational activation and enhanced associative memory for multiple elements in a choice sequence. While these findings enforced the idea that high states of arousal and behavior impact differing aspects of memory when engaged separately - no existing literature has addressed the memory implications when the two are in a concurrent high state of activation. To facilitate this, we propose a study where participants play a horror-survival video game. The horror aspect of the video game will induce a state of high physiological arousal, while the survival aspect of the game will allow for high levels of motivation activation as individuals will get to freely explore. We predict individuals will recall their experience with enhanced perceptual detail recall as well as better associative memories for sequential retrieval. The results of this study will help further unravel the neural mechanisms by which emotional memories are re-lived more vividly than mundane experiences.

Natalya Krutovska

Research Experience Institution: New York University

Research Mentors: Esteban O. Mazzoni, Dylan P. Rahe, and Bhavana Ragipani

Project Title: Understanding Hox gene regulation in response to Wnt signaling during motor neuron differentiation

Project Abstract: Understanding patterning and neuronal subtype diversity in the developing neuraxis is at the crux of understanding neuronal diversity. The vertebrate Hox gene family assigns a positional identity to differentiating neurons along the spinal cord to differentiate into anatomically appropriate subtypes. Hox genes are organized in compact clusters surrounded by distal regulatory elements. During development, retinoic acid (RA) and Wnt signaling activate rostral and caudal Hox genes, respectively. Preliminary data demonstrate that differentiating mouse embryonic stem cells (mESC) respond to regulatory elements within the Hox cluster and RA signaling by activating rostral Hox genes. However, it is not known if the Hox cluster, without long-distance regulatory elements, can respond to Wnt signaling as well. Thus, we aimed to establish a differentiation protocol that will rely on Wnt signaling to activate caudal Hox genes. mES cells were treated with different concentrations of the Wnt signaling activator CHIR99021 (GSK3β inhibitor) and a Sonic Hedgehog Agonist (SAG) to induce ventral spinal cord fate. We identified the proper dosage amount needed to activate the posterior hox region and grow neuronal cells and confirmed that a transposed minimal Hox cluster, devoid of any distal regulatory elements, could activate caudal Hox gene expression in response to Wnt signaling. These results suggest the intrinsic ability for the HoxA cluster to decode positional information in the absence of enhancers or other long-range information outside the cluster. This study provides insights on the mechanisms of posterior Hox induction through Wnt activation in regulating transcription and patterning signals for neuronal differentiation.

Edwin Laboy Torres

Research Experience Institution: Michigan State University

Research Mentors: John J. LaPres and Michelle Steidemann

Project Title: The loss of TSPO and AhR affects the expression of RNA in the mitochondria

Project Abstract: The Aryl Hydrocarbon Receptor (AhR) is a member of the PAS (Per-ARNT-Sim) superfamily of environmental sensors. The AHR is a transcription factor that is found in the cytosol in the absence of ligand. Upon exposure to ligand, such as 2,3,7,8- tetrachlorodibenzo-p-dioxin (TCDD), the AHR will translocate to the nucleus and form a heterodimer with its partner, the Aryl Hydrocarbon Receptor Nuclear Translocator (ARNT). The AHR: ARNT dimer is capable of modulating the expression of a wide battery of genes, most notably those that encode proteins involved in metabolism of xenobiotics, such as TCDD. Several endogenous ligands have also been proposed for the AHR, including cholesterol, heme, and tryptophan metabolites. Interestingly, many of these ligands have also been linked to Translocator protein (TSPO, previously known as the Peripheral Benzodiazepine receptor, PBR) which is an outer mitochondrial membrane protein. TSPO has been linked to the immune response, steroid synthesis, and apoptosis. Given the overlap between putative ligands, we hypothesized that crosstalk exists between the AHR and TSPO and that it would impact AHR mediated transcription. To test this hypothesis, the AHR and TSPO were removed from mouse lung epithelial cells (i.e., MLE12 cells) using CRISPR-Cas9 and then stimulated with TCDD and/or PK11195, a ligand for TSPO, and the expression of several nuclear and mitochondrial encoded genes was assessed. Our results show that loss of TSPO impacts several mitochondrial-encoded genes and that this could impact the organelles' function. Moreover, in the absence of TSPO, the battery of TCDD-induced genes was also significantly impacted.

Caroline Lewis

Research Experience Institution: Washington University in St. Louis

Research Mentors: David M. Holtzman and Michael R. Strickland

Project Title: Impact of LXR Agonist on Amyloid Pathology in Trem2-/- Mice with Amyloid-Î² Amyloidosis

Project Abstract: Triggering receptor expressed on myeloid cells 2 (TREM2) is a genetic risk for Alzheimer's Disease (AD), with rare variants increasing disease risk ~2-4 fold. Trem2 has also been associated with the immune response of microglia to Amyloid-â (Aâ) plaques. Aâ plaques are a hallmark of AD pathology. Plaques cause local neurites to swell, while microglia cells try to mitigate the Aâ pathology by clustering around the plaques. Additionally, TREM2 is a major regulator of cholesterol metabolism in microglia and deficits in TREM2 signaling lead to lipid accumulation and deficits in phagocytosis. In our study, we wanted to see if upregulating cholesterol metabolism using the LXR agonist, GW3965, would be able to compensate for the lack of Trem2 signaling in 5XFAD-Trem2-/- mice and restore microglial clustering around Aâ plaques. In this study, we treated 90-day old 5XFAD-Trem2-/- for 7 days with 10mg/kg/day of GW3965 by intraperitoneal injection, then sacrificed the mice at 100 days old. Using western blot, we analyzed the effect of the drug on upregulating ABCA1 and APOE, proteins heavily involved in cholesterol metabolism and upregulated with the administration of GW3965. We also performed immunohistochemistry to detect dystrophic neurites, plaques, and microglial clustering around plaques. We found that there was no difference in the amount of neuritic dystrophy between the GW3965-treated and vehicle control group. We believe that our drug paradigm was not effective due to its acute nature. We plan to revisit this hypothesis with a longer treatment paradigm using GW3965-containing chow and in-vitro experiments to test if the drug is capable of rescuing TREM2-dependent microgliosis.

Justin Lopez-Roque

Research Experience Institution: Washington University in St. Louis

Research Mentors: Susan Perlman

Project Title: The Relationship between Grey Matter Volume and Anxious Temperament in Young Children

Project Abstract: Childhood personality is a good indication of the emotional development of young children, with previous research suggesting grey matter changes to personality scores (Snyder et al., 2017). Our research aims to tie specific personality temperament scores to changes in Grey Matter Volume (GMV); in particular, tying anxious temperament scores from increasing times in a child's growth to lower GMV in the following regions: amygdala, hippocampus, orbitofrontal cortex, insular cortices, and anterior cingulate cortex. We will take children ages 4-6 and have them complete the Childhood Behavioral Questionnaire (CBQ) and the Childhood Behavior Checklist (CBCL) to determine their personality temperament at each visit. Each participant visited 5 times over the course of two years. On the fifth visit, each participant took a structural MRI after completing the questionnaires. We will take the anxiety temperament scores at visits 1, 3, and 5 and run them through a lasso regression to find trends in growth, then compare to our regions of interest. We expect to see decreases in volume in our regions of interest along with decreases in anxiety temperament.

Mustapha Major

Research Experience Institution: University of Colorado Anschutz Medical Campus

Research Mentor: John Thompson

Project Title: Electrophysiological Changes in Deep Brain Structures Following DBS in Patients with Parkinson's Disease

Project Abstract: Parkinson's Disease (PD) is a neurodegenerative disorder of the basal ganglia. A common treatment for this condition is deep brain stimulation (DBS) in the subthalamic nucleus (STN). While staged DBS surgery has proven effective in relieving symptoms of PD, little is known of its impact on the brain. We evaluated post-surgery electrophysiological changes using microelectrode recordings (MER) at incremental depths between 0.25 mm and 1 mm, obtained from 32 patients (11 women) who underwent staged DBS surgeries at the University of Colorado Anschutz Medical Campus between 2013 and 2017. Significant changes in multi-unit activity between hemispheres following DBS surgery were observed. However, no correlation was found with the duration of stimulation. Additionally, no changes were observed in spike frequency or neuron density.

Miguel Martinez

Research Experience Institution: Michigan State University

Research Mentor: Mark Reimers

Project Title: Brain activity during spontaneous behaviors

Project Abstract: The broad program is to understand the relationship between brain dynamics and spontaneous auto-generated behavior during experiments. Our specific aim here is to characterize the relationship between brain activity and behavior in two experimental animals: mice and zebrafish. Brain activity could be a cause or a correlate of specific actions, and we attempt to decide which is most likely.

Alexandra Martinez Lopez

Research Experience Institution: Washington University in St. Louis

Research Mentor: Gregory F. Wu

Project Title: Quantification and transcriptional features of meningeal B cell clusters in a murine model of multiple sclerosis

Project Abstract: Multiple sclerosis (MS) is an autoimmune disorder characterized by neuroinflammation that affects over 2.1 million people worldwide. Meningeal ectopic lymphoid tissues (ELTs) composed of B cell clusters are associated with the early onset of disability in secondary progressive multiple sclerosis (MS). The mechanisms by which these B cell clusters form and accumulate in the meninges remain unclear. B cell aggregates resembling ELT in patients with MS are observed in an experimental autoimmune encephalomyelitis (EAE) murine model of MS in which B cells have enriched specificity for myelin oligodendrocyte glycoprotein (MOG) and are the only antigen presenting cells capable of regulating CD4 T cell function. We hypothesize that meningeal ELTs are promoted by distinct molecular features of B cells during neuroinflammation. To identify these, we determined the timepoint of optimal ELTs to perform single cell RNA sequencing and investigate features of B cell subtypes. To determine when ELTs are most abundant in our model, we quantified B cell clusters in the spinal meninges of mice imaged through immunohistochemistry and found a significant difference in the number of clusters between 7- and 21-days post onset (dpo) of disease ($p<0.05$) and between 14 and 21 dpo ($p<0.001$). Additionally, we quantified anti-MOG antibodies, produced by mature B cells, using a cell-based assay and found no difference in the quantity of anti-MOG antibodies in the serum of mice 7 (n=2), 14 (n=6), and 21 (n=4) dpo when compared to naive mice. However, although there was no difference in anti-MOG antibodies observed in CSF at each time point, we observed a slight difference in the quantity of MOG at all three time points when compared to Naïve mice CSF. Further, we used single cell RNA sequencing to identify gene expression patterns that highlight functional differences between B cells within the spinal cord meninges and deep cervical lymph nodes of mice at 14 dpo. We identified sub-clusters of B-cells with overexpressed mitochondrial genes. However, quantification through mitotracker dyes and flow cytometry showed no significant difference in meningeal and lymphnode B cell mitochondrial mass. These findings suggest that distinct molecular features of B cells may contribute to ELT development during neuroinflammation, but further experiments are required to determine mitochondrial activation differences. Investigating the formation of meningeal B cell clusters during EAE could provide insight to the formation of ELT and refine B cell depleting therapies for MS and related autoimmune diseases.

Megan Maxwell

Research Experience Institution: Washington University in St. Louis

Research Mentor: Deanna Barch

Project Title: Relationship between neighborhood poverty and children's externalizing behaviors: mediation and moderation by environmental and neurological factors

Project Abstract: Increased rates of internalizing and externalizing behaviors have been observed in children from more impoverished neighborhoods, and correlates of neighborhood poverty such as toxin levels, altered brain structure, or exposure to crime may contribute to this relationship. Additionally, receipt of socioemotional support as a protective factor can mitigate the impact of adversity on children's developmental outcomes. The goal of this project is to examine the extent to which neighborhood poverty relates to children's mental health outcomes independent of household socioeconomic status, and to

determine whether toxin levels and brain volume serially mediate this relationship and whether socioemotional support moderates it. Data from the Adolescent Brain Cognitive Development study were obtained for 8,623 9–10-year-old children; neighborhood poverty was measured using nine census tract variables from the Area Deprivation Index and mental health symptoms were assessed by the Child Behavior Checklist. Toxin levels included particulate matter, nitrogen dioxide, and lead risk measured by the NASA SEDAC while amygdala, dlPFC, and intracranial volumes were obtained by MRI. Socioemotional support consisted of parent, peer, and school sources assessed by various questionnaires. Generalized linear models and structural equation modeling tested for evidence of a mediation and moderation. Increased neighborhood poverty was significantly associated with increased externalizing symptoms, and reductions in intracranial volume mediated this relationship. Increased parental support as indexed by the Parental Monitoring Survey attenuated this relationship, but only for children lower in poverty. These results highlight the importance of identifying environmental and neurological markers that may increase risk for later psychopathology in order to better inform holistic interventions designed to reduce the burden of mental illness.

Nylah Miles

Research Experience Institution: Temple University

Research Mentors: Elizabeth A. Birmingham, Lisa A. Briand, Anna McGrath, and Brigham T. Rhoads

Project Title: Post-weaning social isolation alters sociability in male mice but not female mice

Project Abstract: Adolescence is a critical period for brain development. Adversity during adolescence can have long lasting effects behavior and brain development. Social isolation and loneliness may lead to detrimental mental health outcomes in women although most of the work on social isolation has been performed in male animals. Our lab has previously shown that post-weaning social isolation increases vulnerability to reinstatement of cocaine seeking in adulthood and this impact of social isolation does not extend to reinstatement of sucrose. However, the impact of social isolation on social reward in unknown. Therefore, the current study examined the effects of post-weaning social isolation on social interaction during adolescence and adulthood in male and female mice. At weaning (PND21), mice were either group-housed or were isolated. When we tested mice in a three-chamber sociability task during adolescence (PND45), we found that both adolescent male and female mice spent more time sniffing a novel mouse than a novel object regardless of their housing condition. However, when the mice were tested during adulthood (PND60), male mice that were socially isolated at weaning maintained this preference for interacting with a novel social partner, whereas male group housed animals did not. In contrast, female mice in the group housed condition maintained social preference whereas socially isolated females did not. Taken together, adolescent social isolation leads to sex-specific changes in social interaction in adulthood.

Maxwell Miyasato

Research Experience Institution: University of California Berkeley

Research Mentors: Stephen Brohawn. Kimberly Dolan, and Christopher Hoel

Project Title: The Structural Determination of TREK-1 in Lipid Nanodiscs by Cryogenic Electron Microscopy

Project Abstract: TREK-1 is a member of the two-pore-domain potassium (K2P) family of leak type channels and is responsible for cell excitability and maintaining resting membrane potential. TREK-1 is regulated by

a variety of physiological stimuli including pH change, voltage, and pressure. Impaired function of TREK-1 is associated with pathologies of the central nervous system such as depression, pain, and epilepsy, and is accordingly an important target for antidepressants, general anesthetics, and an array of therapeutics. Despite the important roles TREK-1 plays in human physiology and disease, the molecular basis of its regulation is poorly understood. To address this problem, our project aims to optimize conditions for structural studies of TREK-1 in a near native environment using cryogenic electron microscopy (cryo-EM) and lipid nanodiscs. Towards this aim, we expressed and purified TREK-1 from yeast and successfully reconstituted the ion channel in lipid nanodiscs. We froze this sample on three different types of cryo-EM grids—amorphous carbon support, graphene oxide support, and holey carbon—for future screening. The screening of these grids and optimization of the conditions for structural studies of TREK-1 using cryo-EM will enable future work to uncover how physiological stimuli regulate and influence the conformational landscape of this essential protein.

Abna Moalin

Research Experience Institution: University of Washington

Research Mentors: Tanvi Deora and Katie Stanchak

Project Title: Mechanical Sensor Distribution on Hawkmoth

Project Abstract: Insect flight relies on the sensory feedback it receives from mechanosensors across the insect body; these neurons convert mechanical forces to electrical signals interpretable by the brain. Feedback from these mechanoreceptors provide information about the state of the body and environment to the central nervous system. Since these sensors detect local information, distribution is extremely important to understand one's environment. This research focused on the distribution of Campaniform sensilla (CS), a kind of mechanoreceptor, found on the insect body with a focus on wings. The distribution of CS likely shapes the feedback insects receive on its body's kinematics. And hence, it is important to investigate the distribution of CS across wing morphologies. I used a hawkmoth, Manduca Sexta, to establish a protocol to quantify precise CS distribution on the wing using microscopy. I used a kimwipe to descale the wing to reveal the veins of the moth. Once the veins are visible, I used an electric duster, tape, and a fine paintbrush under a compound microscope to ensure clear imaging. I then imaged the wing under a confocal microscope to take a high-resolution single CS image and a lower resolution image of the entire wing. I mapped the location of the CS identified in the higher resolution onto the lower resolution full wing image to determine the sensor distribution. This map can be used to compare sensor distribution of various wing morphologies. Understanding variations in sensor distributions will deepen our understanding of insect flight and help advance future technological innovations.

Kayla Moehn

Research Experience Institution: University of Colorado Anschutz Medical Campus

Research Mentors: Emily Bates and Yunus Ozekin

Project Title: Investigating the Effects of Vaping and Nicotine's Block of Kir2.1 on Humerus and Digital Development in Embryonic Mice

Project Abstract: Kir2.1 is an ion channel that is important for skeletal development. Nicotine, a common ingredient in electronic cigarettes, blocks Kir2.1. However, little research has been done to investigate how vaping nicotine during pregnancy affects embryonic development. We examined how vaping nicotine

during pregnancy would affect embryonic skeletal development in mice. Mice pregnant with embryos of three genotypes—wild-type, *Kir2.1*$^{+/KO}$, or *Kir2.1*$^{KO/KO}$—received either no vaping treatment, a 2.4% freebase nicotine vaping treatment, or a 3.6% nicotine salt vaping treatment throughout pregnancy. The embryos were dissected at E18.5, and their skeletons were extracted and stained for imaging. The lengths of the humerus bones and number of digital bones were calculated to quantify differences in bone development between groups. We found significant differences in humerus length between the wild-type no vape and wild-type 2.4% freebase nicotine groups, as well as the *Kir2.1*$^{+/KO}$ no vape and *Kir2.1*$^{+/KO}$ 2.4% freebase nicotine groups. However, no significant differences were found between wild-type no vape and wild-type 3.6% nicotine salt groups, as well as *Kir2.1*$^{+/KO}$ no vape and *Kir2.1*$^{+/KO}$ 3.6% nicotine salt groups. We suspect that nicotine salts are metabolized faster than freebase nicotine and thus inhibit Kir2.1's function for a shorter amount of time, but further research needs to be conducted to test this hypothesis. We conclude that fetal exposure to vaped free base nicotine impacts the development of long bones and reduces long bone length.

Danh Ngoc Nguyen

Research Experience Institution: University of Washington

Research Mentor: Jenny Taylor

Project Title: A motor protein contributes to 3D genome organization

Project Abstract: Spatial localization of the genome is important for cellular functions, but many mechanisms of genome localization are still unknown. The Cabernard lab has shown that throughout interphase, centromeres localize close to the apical centrosome in *Drosophila melanogaster* neural stem cells, and this localization pattern is dependent on microtubules (MTs). Since MTs are in the cytoplasm and centromeres are in the nucleoplasm, it is unclear how they are connected. One possibility is that MTs can bind to a protein complex, which could act as a "bridge" between MTs and centromeres. Kinesins are MT binding motor proteins and they have been implicated in connecting MTs to nuclear envelope proteins, we hypothesize that kinesins are required for centromere localization. To test this hypothesis, we are performing an RNAi screen of kinesins, using spinning disk fluorescence microscopy to record time-lapse images of MTs and centromeres. If a particular kinesin is required for centromere localization, we would expect to see disrupted centromere localization in the knockdown. In this study, I screened eight RNAi lines, representing five different kinesins, in duplicate. I found that knockdown of kinesin Klp64D caused disruption of centromere localization in a few cells. The mislocalized centromeres move around the periphery of the nucleus and remain as clusters. In future work, I will determine if knockdown of Klp68D, the other kinesin in heterotrimer, also disrupts centromere localization. This work provides some preliminary insight into how centromeres are positioned in *D. melanogaster* neural stem cells.

Amajindi Nwankpa Jr.

Research Experience Institution: Yale University

Research Mentors: Clayton Barnes, Daniel G. Barson, Jessica A. Cardin, and Michael J. Higley

Project Title: Quantifying the effects of saccadic eye movements on visual responses and receptive field measurements in V1 of the awake mouse.

Project Abstract: In the visual system, many species possess the ability to move their eyes rapidly in order to scan their surroundings. For mice, which lack a foveal region of the retina, the function of these

saccades in visual processing is not well understood. In addition, neurons in the mouse primary visual cortex (V1) respond preferentially to relatively large stimuli, in contrast to primates and carnivores, potentially reducing the impact of small changes in eye position on visually evoked neural activity. Thus, the consequences of saccades for visual processing in the mouse are unclear. Here, we developed a novel method for calculating gaze shifts in awake, head-fixed mice presented with visual stimuli comprising either sinusoidally drifting gratings or filtered noise patterns. We used 2-photon calcium imaging of GCaMP6s-expressing neurons in V1 to quantify visually-evoked single cell response magnitudes and receptive field structure. We simultaneously monitored spontaneous variation in the animal's behavioral state, measured by pupil diameter, facial movements, and locomotion. We then asked whether including estimates of eye position significantly improved response measurements. Our results suggest that saccades are temporally coupled to changes in behavioral state. Moreover, changes in eye position are capable of altering the response to visual inputs, suggesting a behaviorally relevant function for these movements. Overall, these findings indicate that eye position should be considered in experimental studies of visually-evoked activity in the mouse and that, as in other species, mouse vision represents an active process of acquiring information about the external environment.

Beverly Obodaifio

Research Experience Institution: University of Maryland School of Medicine

Research Mentors: Sarah Clark and Todd Gould

Project Title: Neuroinflammation in the brain and association to stress exposure

Project Abstract: Exposure to stress can result in compromised immune function through the disruption of homeostasis in biological systems. It is hypothesized that the immune system plays a role in modulating behavioral responses to stress and that mice that are susceptible to stress will display elevated neuroinflammation. Although the immune system has limited access to the brain, there are resident microglial cells with immune-like properties, including the ability to act as phagocytic cells. Exposure to severe stress can elicit changes in immune function and result in microglial activation, typically associated with changes in activation states that are evidenced by their morphology and visible processes. Microglia activity in brain areas such as the hippocampus and amygdala, which are responsive to stress, could provide insight regarding neuroinflammation and behavioral stress responses. Using an inescapable stress model, mice received repeated foot shock stress and were categorized as resilient or susceptible by their behavioral responses when provided an option to escape. The brain was then collected, and microglia were visualized through immunohistochemical labeling of Iba-1, a marker of microglia. The goal is to analyze Iba-1+ microglia in the hippocampus and amygdala of stressed compared to non-stressed animals. It is expected that greater indications of neuroinflammation in stressed mice will be visible with increased Iba-1 expression and more microglia in an activated stare. Furthermore, we predict that stress susceptible mice will show greater signs of neuroinflammation than resilient mice.

Geraldine M. Ortiz Sosa

Research Experience Institution: Michigan State University

Research Mentors: Janelle LeMon and Adam Moeser

Project Title: Sex Differences in Median Eminence Mast Cells During Hypothalamic-Pituitary-Adrenal Axis Stress Response

Project Abstract: It is known that females exhibit stronger hypothalamic-pituitary-adrenal (HPA) axis activation and more blunted negative feedback in response to stress, compared with males. Females typically suffer more from chronic stress illnesses such as depression and post-traumatic stress disorder (PTSD), but the mechanisms remain poorly understood. The median eminence (ME) is situated between the hypothalamus and the pituitary gland and is a functional link between stress hormone release from the brain and transmission to the body during HPA axis activation. Mast cells (MCs) are immune cells rapidly activated by stress, exhibit sexual dimorphism, and are abundant in the ME, however, it is still unknown their role during the stimulation of the HPA axis. Therefore, our overall objective is to understand the function of MCs, the ME pathway, and their contribution to sex differences in the HPA axis stress response. The objective of this study is to determine whether the number of MCs in the ME change in response to HPA axis activation. We used Mcpt5-Cre tdTomato mice, whose mast cells express a fluorescent protein allowing us to quantify and localize MCs in the ME. To induce HPA activation, adult female and male mice adults were administered 10 mg/kg of lipopolysaccharide (intraperitoneal injection). At 6 hours post-injection, animals were perfused with paraformaldehyde for brain fixation and sections containing ME were prepared for immunostaining for MCs. The MCs count revealed a slightly larger number of MCs in LPS treated female mice compared with the other treatment groups. Due to the low n at this point (n=1-2 animals/treatment), we cannot make a conclusive statement regarding sex differences or the effects of LPS. However, we were able to confirm the presence of MCs in the ME with the Mcpt5-Cre-tDT mouse model. This research project will lead us to a broader understanding of the sex differences in the ME MCs during HPA axis activation.

Beau Oster

Research Experience Institution: University of California Berkeley

Research Mentors: William Jagust and Kailin Zhuang

Project Title: Predicting Alzheimer's Disease with quantitative cortical thickness models

Project Abstract: Alzheimer's Disease (AD) is characterized by episodic memory and executive function loss. AD pathology includes amyloid-β (Aβ) plaques, tau aggregates, and reduced cortical thickness. These can be observed in the cognitively normal (CN), and individuals with mild cognitive impairment (MCI), and AD. This study investigated regions where cortical thickness maximally differentiates between AD and CN subjects to predict AD conversion in MCI subjects. We included 573 (male = 291, female = 282, mean age = 74) subjects from the AD Neuroimaging Initiative (ADNI), including 269 Aβ- CN, 230 Aβ+/- MCI, and 74 Aβ+ AD. Aβ and tau were measured with positron emission tomography (PET). Cortical thickness was measured with magnetic resonance imaging (MRI). Cognition was assessed with five memory composite exams. Cortical thickness differences between CN and AD were calculated using Cohen's d for effect size. A logistic regression model using entorhinal and superior temporal cortical thickness, age, sex, and apolipoprotein ε4 status best differentiated CN and AD. A receiver operating characteristic (ROC) curve assessed optimal accuracy (sensitivity = .892, specificity = .885, AUC = .952, threshold = .221). We applied this model in MCI to predict Aβ status, but the precision was poor (sensitivity = .509, specificity = .720). The model's prediction of AD features significantly correlated with Aβ (r = .246), entorhinal (r = .365) and temporal tau (r = .299), and all cognitive measures (all $p < .001$). Cortical thickness is correlated with features of AD, but it is too nonspecific to predict Aβ status.

Ephraim Oyetunji

Research Experience Institution: Washington University in St. Louis

Research Mentors: Timothy Miller and Kathleen Schoch

Project Title: Antisense Oligonucleotide-mediated TREM2 Reduction in Tauopathy Mice Regionally Alters Phosphorylated Tau in the Absence of Microglia Activation

Project Abstract: Microglia-driven neuroinflammation, along with amyloid-beta plaques and hyperphosphorylated neurofibrillary tangles, contributes to Alzheimer's disease (AD) pathology and facilitates neuronal damage. Genetic variants of microglial genes, including TREM2, have been shown to increase AD risk. TREM2 encodes a microglial receptor, which mediates microglial transition from a homeostatic state to an activated, neurodegeneration-associated state. Though TREM2-deficient tauopathy mouse models suggest that TREM2 deletion reduces neuroinflammation, TREM2 haploinsufficiency exacerbates tau pathology and reduces microglial response to injury. However, it is unclear what short-term reductions in TREM2 reveal about its role in tau pathology. We used a mouse-specific TREM2 antisense oligonucleotide (ASO) and acutely reduced TREM2 gene expression in mutant tauopathy mice after the onset of pathology. One month later, brain tissues were probed for phosphorylated tau (p-tau), microglial activation markers, and proinflammatory cytokines. Although there were no statistically significant differences in p-tau in the total hippocampus or its subregions, ASO mediated TREM2-lowering appeared to reduce p-tau within the dentate gyrus and CA3 hippocampal subregions but promote p-tau in the CA1. Surprisingly, microglial activation (evidenced by CD68, Spp1, and other genes) and microgliosis (Iba1 reactivity) were unaltered by TREM2 reduction, suggesting microglial activation is independent of region-specific tau pathology. Our results reveal the complexity of TREM2 as a neuroinflammatory gatekeeper and could inform a region-based therapeutic approach to reducing tau pathology.

Darwing S. Padilla-Rolón

Research Experience Institution: Michigan State University

Research Mentors: Brian D. Gulbransen and Jonathon McClain

Project Title: Enteric Glial Cells Modulate Neutrophil Infiltration in the Gastrointestinal Tract in Ulcerative Colitis

Project Abstract: Inflammatory bowel diseases (IBD) are characterized by chronic inflammation of the gastrointestinal (GI) tract. It affects 1.3% of US individuals with a higher prevalence on ages between adolescence and young adulthood. One of the most common IBDs is ulcerative colitis (UC), which causes inflammation and ulcers in the distal and innermost part of the large intestine. Mechanisms resulting in UC include altered neuro-immune interactions in the enteric nervous system (ENS) and GI tract, but the signaling processes that link immune activation with visceral hypersensitivity are unresolved. Recent advances in our understanding of the immune and nervous system indicate that enteric glial cells (EGC) modulate immune cells in the GI tract. Previous single-nuclei multiomic analysis data has shown that genes encoding Neutrophil cytosolic factor 4 and Cxcl5 are highly changed in EGCs during peak UC. Both neutrophil cytosolic factor 4 and cxcl5 genes influence neutrophil function. Therefore, EGCs might be modulating neutrophil migration to the distal colon and/or phenotype during UC. We are performing our studies in an experimental animal model of UC achieved by administration of dinitro benzene sulfonic acid (DNBS) enema. Objectives include harvesting tissue and analyzing infiltration of neutrophils by performing immunohistochemistry labeling on fixed samples. Expected results are to observe an increase in neutrophil

infiltration in DNBS treated mice, in comparison to wild-type mice. These studies will contribute to: i) further understanding of the neuron-glia interaction of the ENS and ii) how glial changes during inflammation contribute to both related and non-related gastrointestinal tract diseases.

Asia Parson

Research Experience Institution: Washington University in St. Louis

Research Mentors: Michael Perino and Chad Sylvester

Project Title: Attention Alterations in Pediatric Anxiety: Evidence from Behavior and Neuroimaging Follow Up Study

Project Abstract: Children with anxiety disorder diagnoses may have increased attention to unexpected stimuli coupled with increases in brain activity in the Ventral Attention Network (VAN). Previous work in from our lab (Perino et al., 2021) explored these effects in a sample of n = 41 children, average age 10 years, about half of whom had an anxiety disorder. In this previous study, higher anxiety was associated with higher activation levels in the inferior frontal gyrus within the VAN following the onset of neutral stimuli. However, the stability of these effects has yet to be investigated. In this study, we repeated the original experiment in a subset (n=41) of the same participants 2 years later to see if these relationships were still present. Here we show that there was a strong correlation between wave 1 and wave 2 (average age = 13) anxiety (r =.74, p = .689). Contrary to the previous results from wave 1, in wave 2 there was no significant relation between stimulus driven attention and anxiety, and there was no significant correlation between brain activity in the inferior frontal gyrus and anxiety (r = -.090, p = .618), Analyses were limited by a small sample size in wave 2 relative to the original wave 1 dataset. If the negative results of the current study are upheld in larger sample sizes, our results suggest that brain activation in response to anxiety does not remain stable over time and may be reflective of a certain time point in life. This information is useful for creating more specific brain targeted treatment in children with anxiety, that can be tailored to VAN activation changes over time. We anticipate this information to aid in future anxiety treatments for children and early adolescents.

Ikponmwosa Pat-Osagie

Research Experience Institution: University of Michigan

Research Mentor: Natalie Tronson

Project Title: Regulation of the acute stress response by oral contraceptive hormones

Project Abstract: “The Pill” and other hormonal contraceptives (HCs) are a central part of women’s healthcare. They provide control over reproductive timing, and additional health benefits to many individuals. For some people, HCs trigger depression and other negative affective states; yet for others, HCs exert protective effects against depression. In this project, we aim to understand how interaction between HC hormones and the HPA axis contributes to vulnerability or resilience to negative affective states. Specifically, we aimed to determine how different progestins commonly used in HCs regulate the stress response. We used a mouse model of HC hormone exposure recently developed in our lab, ELISA assays to assess corticosterone concentration, and cFos immunohistochemistry to identify stress-induced activation of brain regions and networks. We examined both C57Bl/6N and the more stress-responsive Balb/c mice to understand how individual differences in stress responsivity might contribute to changes in HC-induced risk for depression. Young adult female mice were given either ethinyl estradiol (EE; 0.075

μg/mL) and levonorgestrel (LNG; 3 μg/mL), a progestin with androgenic properties; or EE and drospirenone (DRSP; 15 μg/mL), a progestin with anti-androgenic properties, in a 10% sucrose suspension (0.25 mL) daily at 5pm. Based on data from women HC users, we hypothesized that HC hormone exposure would cause suppression of the corticosterone response to an acute stressor. We observed that mice exposed to EE+LNG showed significant blunting of the stress response as measured by serum corticosterone concentration. Surprisingly, mice treated with EE+DRSP did not show this effect. These data demonstrate that different progestins differentially modulate the HPA axis, thus progestin androgenicity may be a central factor in altered risk or resilience to depression for women on HCs. Future work will further establish whether the effects of different progestins on stress response are mediated via androgenic receptors, or via mineralocorticoid and glucocorticoid receptors. This work lays the foundation for guiding the choice of HC formulation to increase individual women's resilience to negative affective states including depression.

Blanca Perez

Research Experience Institution: Washington University in St. Louis

Research Mentors: Erik Herzog and Jeff Jones

Project Title: Using machine learning to reveal sex- and genotype-dependent circadian behaviors

Project Abstract: The suprachiasmatic nucleus (SCN) serves as a master clock in the hypothalamus, driving nearly all daily behaviors and processes in the body through synchronization with environmental cues. Morphological differences between sexes are present in the neural pathways driving circadian behavior, such as estrogen-dependent differences in glucocorticoid rhythmicity. However, identifying the specific differences in behavior can be time-consuming and inaccurate using traditional methods. Here, we use a novel machine-learning classifier, DeepEthogram, to automatically score several behaviors in multi-day videos of single-housed mice while being largely unbiased. We found that DeepEthogram was able to successfully score several million frames of video while only requiring human produced labels for a small fraction of the total frames. Additionally, we have been able to validate behaviors using a MATLAB script to identify locomotor activity in the same multi-day videos, further confirming this machine learning mechanism for studying circadian behaviors. These results demonstrate how we can apply machine learning to study circadian behaviors that were previously very difficult and time-consuming to observe. We anticipate that this method will be used to quantify behavioral phenotypes in different genotypes, disorders, and model organisms for many different projects.

Marina P. Perez Gil

Research Experience Institution: Michigan State University

Research Mentor: James Galligan and Krishna Yelleswarapu

Project Title: Immunohistochemical analysis of endogenous α-synuclein in the mouse myenteric plexus

Project Abstract: Constipation is a predominant complaint in 61.4% of patients with Parkinson's disease (PD). Colonic motility is mediated by the coordinated activity of the excitatory and inhibitory motor neurons found within the myenteric plexus of the enteric nervous system (ENS). PD is a progressive nervous system disorder that is associated with alpha synuclein (α-syn) pathology. α-syn, a presynaptic terminal protein involved in vesicular neurotransmitter release, is found to aggregate in the ENS of PD patients. Disruptions in neurotransmission within the ENS may lead to colonic dysmotility. Our objective is to find which neurotransmitter neurons and nerve fibers overlap with endogenous α-syn neurons and nerve fibers within

the myenteric plexus of the mouse colon that regulate colonic motility. We will perform immunohistochemistry on longitudinal muscle myenteric preps (LMMP) of the mouse proximal colon by using choline acetyltransferase (ChAT), nitric oxide synthase (NOS), tyrosine hydroxylase (TH), and vesicular nucleotide transporter (VNUT), to label for neurotransmitters: acetylcholine, nitric oxide, dopamine, and ATP. We hypothesize that α-syn will be immunoreactive with cholinergic, purinergic, and dopaminergic neurons. We hope to draw parallels between the expression of endogenous α-syn and the aggregated α-syn within the myenteric plexus of the mouse colon.

Kelsey Person

Research Experience Institution: Washington University in St. Louis

Research Mentor: Meaghan Creed

Project Title: The ventral pallidum constitutes the main inhibitory projection to the ventromedial subthalamic nucleus

Project Abstract: Alcohol use disorder (AUD) is a chronic relapsing disorder accounting for ~5% of global disease burden. AUD is characterized by impaired decision-making processes, wherein attractive, short-term outcomes are deemed more important than aversive, long-term consequences. The ventromedial subthalamic nucleus (vmSTN) has been implicated in control of decision making. For example, reactive inhibition (defined as the ability to stop an action in process), correlates positively with vmSTN firing but is impaired in people with AUD and whereas impaired decision-making is linked to a decrease of vmSTN burst firing. One possible mechanism underlying impaired reactive inhibition is enhanced inhibitory tone in the vmSTN. However, few inhibitory inputs to the vmSTN have been described. The ventral pallidum (VP) offers one logical candidate; the VP is a limbic structure, mainly GABAergic, and overactive in patients with inhibitory control deficit. While it has been shown that the VP projects onto the STN, an inhibitory projection from the VP to the vmSTN is rarely taken in account and has not been investigated. Here, we use a Cre-dependent retrograde switch virus injected in the vmSTN of Vgat-Cre mice to identify GABAergic and non-GABAergic vmSTN-projecting populations. We corroborate the existence of an inhibitory VP to STN projection, as well as an additional structure neighboring the VP. Consistent with previous findings, we also observed glutamatergic projections to vmSTN from the motor and cingulate cortices. This preliminary study identifies the VP as the main inhibitory input to the vmSTN. Investigating the function of the pathway in pathophysiological conditions could establish new neural substrates for impaired decision-making processes in AUD.

Alexandra N. Ramirez

Research Experience Institution: University of Colorado Anschutz Medical Campus

Research Mentors: Ethan Hughes and Michael Thornton

Project Title: High Pulse Energy, Low Damage: Optimizing 3-photon excitation for longitudinal in vivo imaging of mouse cortical gray and white matter

Project Abstract: Multiple sclerosis (MS, an autoimmune disease) has recently been discovered to affect both white and gray matter. In our lab, we use in vivo multiphoton microscopy methods to track individual oligodendrocytes longitudinally and assess region-specific differences in oligodendrogenesis and remyelination following cuprizone demyelination. 2-photon microscopy (2P) is limited to imaging depths of ~400 μm into the mouse cerebral cortex through a transcranial window. The development of 3-photon in

vivo microscopy (3P) increases this depth limit to ~1200 µm, reaching into the subcortical white matter in certain regions of the mouse cerebral cortex. Because 3P requires high pulse energy, the potential for tissue damage is significantly higher than 2P, and such effects are magnified with longitudinal imaging. In this study, we used immunofluorescence (IF) and confocal imaging to test multiple markers of cellular and molecular stress. We found that, within our empirically determined laser power limits, longitudinal 3P in vivo imaging did not significantly increase the fluorescence intensities of MOBP-EGFP (oligodendrocytes), Iba-1 (microglial reactivity), GFAP (astrocyte reactivity), and 8OH-dG (a neuronal RNA oxidation marker) compared to contralateral controls, while the intensity was significantly decreased compared to laser-exposed positive controls. Additionally, we analyzed multiple markers of molecular stress, including heat shock proteins and DNA damage markers, with confocal colocalization methods. Our results show that longitudinal 3P imaging over multiple months is sustainable without inducing laser damage and cellular stress and provide important evidence to guide imaging power guidelines for future studies employing longitudinal 3P imaging.

Liatris Renee Reevey

Research Experience Institution: University of Washington

Research Mentors: Asad Beck and Horacio de la Iglesia

Project Title: Predicting Epileptic Activity in Mouse Models using Artificial Intelligence

Project Abstract: Epilepsy is a neurological disorder that affects many people, and is characterized by seizures and interictal spikes, whose frequency can help determine seizure risk. By recording neural activity from mouse models of generalized and focal epilepsy, can a machine learning algorithm can be used to detect interictal spikes? The neural activity was recorded by using two electrocorticography electrodes and one electromyography electrode. To train the machine learning algorithm, interictal spikes are be scored by hand and the features are extracted and deconstructed using Python. In the process teaching it to recognize interictal spikes.

Shamauri Joshua Rivera

Research Experience Institution: Yale University

Research Mentors: Steve Change and Olivia Meisner

Project Title: How sex and dominance interact with social position to affect prosocial behaviors in marmosets (*Callithrix jacchus*)

Project Abstract: Research in prosocial behaviors garnered much interest in the field of social neuroscience over recent years, but human research is limited in its ability to address the underlying neural mechanisms of these behaviors. Research in this domain using rodent models has furthered our understanding of the neural circuit's mechanisms of social behaviors. However, the rodent model also faces limitations when it comes to modeling human social behaviors. For example, the fundamental mode of social communication between rodents (olfactory) is much different than the largely visual communication used by primates. Primate models have been beneficial to social neuroscience due to their complex social communication and environments that more closely resemble that of humans. More recently, the common marmoset (*Callithrix jacchus*) has emerged as a model system for investigating the neural bases of primate social behaviors. Despite evolutionarily diverging much earlier from humans compared to macaques or capuchins, they are cooperative breeding and highly prosocial species small in size and easy to maintain in captivity. Though marmosets are potentially an excellent comparative model for human cooperative prosociality, their complex group dynamics also can stand as an obstacle. In this

meta-analysis we will investigate how sex and dominance interact with social role to affect prosocial behaviors in the common marmoset. As the identity of individual monkeys dictate much of marmoset social life, we will investigate how the sex, position within dominance hierarchy, and social role dictate which members of a colony are more likely to perform prosocial behaviors and if a correlation exists across this species. We are exploring previous research where prosocial and cooperative behaviors demonstrated and identify which individuals successfully display different types of prosocial behaviors in these experiments. As social experiments in marmosets tend to successfully elicit cooperative social behaviors in a subset of individuals, we aim to identify which individuals are most likely to engage in these behaviors. As their allocation of prosocial behaviors among members is variable, this investigation hopes to shed light on the complex social structures of marmosets to help inform future social neuroscience research in these species.

Maria V. Rivera-Santana

Research Experience Institution: Johns Hopkins University

Research Mentor: Nitish Thakor

Project Title: A size-invariant model for studying direct neurotization of vascularized muscle grafts: Does reinnervated muscle size affect function and viability?

Project Abstract: Regaining mobility and independence after a limb amputation is a particularly challenging process for an amputee, hindered further by outdated prostheses that are difficult to use. Direct neurotization is a technique that could help solve this problem by providing interfaces for enhanced and intuitive prosthetic control. This technique can be implemented using vascularized denervated muscle targets (VDMTs), a type of tissue construct that consists of removing the endogenous innervation from a vascularized muscle graft and allowing the graft to be reinnervated by the residual stump of a severed nerve. The optimal VDMT graft size and geometry that would yield maximal muscle viability and health for enhanced prosthetic control is currently unknown. We ask the following question: does graft size influence muscle health and functional recovery during the months-long process of reinnervation? To answer this, it is necessary to first establish a VDMT model to compare outcomes across differently sized grafts, which we propose here. Our gastrocnemius muscle VDMT model can help elucidate the effect of graft size over muscle health and function through the comparison of three VDMT size groups (“Large”, “Medium”, and “Small”). We discuss the model’s reproducibility, feasibility for functional testing, and clinical translatability, all of which make this a promising preclinical research model. Future studies can use this model to compare outcome measures of muscle health, as measured through electrophysiology and histology, and functional recovery, as measured through isometric force production, across different VDMT size groups. Discoveries on vascularized reinnervated muscle in relation to graft size could help us identify which graft size characteristics would result in healthy and viable VDMTs, through which high-quality signals could be acquired for prosthetic control in the future.

Maximino Robles

Research Experience Institution: University of Colorado Anschutz Medical Campus

Research Mentor: Gidon Felsen

Project Title: Triggering eye movements in mice to understand stable visual perception

Project Abstract: Our project is motivated by the question of how the brain suppresses perception sometimes. Specifically, during motion signals of motion that we voluntarily generate with our eyes. To have a model for answering this question, we first need to reliably elicit these voluntary eye movements.

Presenting a drifting grating, the Felsen and Poleg-Polsky labs did that in mice except the eye movements were involuntary. Presenting a moving center that radiates dots, other scientists did that in primates and the eye movements were voluntary. We want the same stimulus to work on mice because they're more ethical subjects. Therefore, we hypothesized that that a mice-adapted stimulus would work on mice. We discovered that the moving center of our stimulus elicited eye movements. Next, we discovered the moving center of the stimulus elicited involuntary eye movements. Next, we discovered the moving center of the stimulus elicited more eye movements when on the left side of the screen. Since this came from expanding dots, a next step should be to try contracting dots. Ultimately, our data doesn't support the hypothesis that our mice-adapted optic flow stimulus would elicit voluntary eye movements. We could expect difficulty in eliciting voluntary eye movements in mice because they have such large field of vision and spread-out photoreceptors that they may not need voluntary eye movements. Our results were relevant because they say something about the potential of mice as models to understand how we make sense of a moving world when we ourselves move in it.

Oscar Romero

Research Experience Institution: Washington University in St. Louis

Research Mentor: Tristan Li

Project Title: Microglia Heterogeneity in Mice Aging and Parabiosis Model by Single-Cell RNA Sequencing

Project Abstract: Aging can change microglia's ability to maintain homeostasis by decreasing its surveillance speeds, becoming more reactive, and expressing more proinflammatory genes. However, it remains unknown how aging affects microglia's gene expression. To investigate the effects of aging in microglia gene expressions, we used single-cell sequencing in parabiotic and singular mice models. The singular mice model allowed us to observe how microglia-like clusters change as they age. A parabiosis model will let us observe the gene expressions changed when a young mouse receives blood plasma from an older mouse and vice-versa. By separating microglial-like cells into different clusters based on variable genes, we were able to learn about microglia heterogeneity and its relation to aging.

Jesús Manuel Rosario-Claudio

Research Experience Institution: Michigan State University

Research Mentor: Geoffroy Laumet

Project Title: Regulation of inflammation by sensory neurons

Project Abstract: Inflammation is a beneficial process designed to contain and eradicate threats to the host organism. However, dysregulated inflammation, including in the nervous system, is a central pathological process in diverse disease states. It is critical to understand the mechanisms that regulate inflammation. One of the master regulators of inflammation is the anti-inflammatory molecule interleukin (IL)-10. Traditionally it is thought that IL-10 signals to its receptor (IL- 10R1) on immune cells to regulate inflammation. Lately, it has been demonstrated that sensory neurons also expressed IL-10R1, suggesting that IL-10 may regulate inflammation by signaling to sensory neurons. Recent preclinical works have shown that some sensory neurons actively regulate joint, skin, lung, and gastrointestinal inflammation. Hypothesis: For this project, we hypothesize that IL-10 receptors on sensory neurons regulate inflammation. Experimental methods: Inflammation is induced by intraperitoneal injection (IP) of lipopolysaccharide (LPS) and assessed by changes in body weight (BW), locomotor activity (LMA), and

cytokine expression of tumor necrosis factor (TNF) and IL-1β by RT-qPCR in the spinal cord (SC) and liver to compare the expression of cytokines at the central and peripheral terminals of the sensory neurons. The animal models used were wild-type (WT) and sensory neuron IL-10R1 knock-out (KO) mice. To specifically remove IL-10R1 only on sensory neurons; AvilCre mice (Cre recombinase expressed specifically on sensory neurons) were crossed Il10ra-flox mice. Cre recombinase will remove the gene Il10ra only on sensory neurons. Results: we validated that LPS induces a reduction of BW and LMA and increases the expression of TNF and IL-1β on the spinal cord (CNS) and liver (periphery) in WT mice. The preliminary results illustrated that the reduction of BW and LMA was exaggerated in female KO mice and, the upregulation of TNF and IL-1β was exaggerated in male KO mice. Additionally, we identified 18 neuropeptides with a high expression on Il10ra-positive sensory neurons. We confirmed that IL-10 receptors on sensory neurons regulate some aspects of inflammation.

Karen San Agustin

Research Experience Institution: New York University

Research Mentor: Prerana Shrestha

Project Title: Rescuing stress induced anxiety in a mouse model of tuberous sclerosis complex

Project Abstract: The mammalian target of rapamycin complex (mTORC1) pathway is implicated in integrating and responding to various cues including cellular stress and growth factors. Tuberous Sclerosis Complex (TSC) is involved in mediating the mTORC1 pathway by inhibiting Rheb, an mTORC1 activator. Since oxytocin receptors mediate the mTORC1 pathway through TSC, we chose to look into the role of Tsc2 in Oxytocin receptor neurons and what happens when you delete Tsc2 in these cells. Given that there is sexual dimorphism in oxcytocin receptor expression we postulated that there could be sex differences in how TSC manifest when Tsc2 is selecitvely deleted in oxytocin receptor neurons. To answer this question, we carried out behavioral protocols with male and female heterozygote Tsc2 mutant mice. We used social isolation stress because oxytocin is thought to play a role in anxiety related behavior, and we wanted to induce a stress related phenotype. Amongst the behaviors carried out, we found that socially isolated mutant male mice display more anxiety-like behavior in the open field test as they spend less time in the center of the field and in the marble burying test as they bury less marbles. Female mice displayed social anxiety such that socially isolated females showed no preference for the mouse or object in a three-chamber social interaction test. We were able to rescue these phenotypes using a PERK inhibitor given that TSC also plays a role in the integrated stress response through the activation of elf2alpha kinase PERK.

Krystal M. Santiago Colon

Research Experience Institution: Michigan State University

Research Mentors: Zayn Al-Zahid, Geoffroy Laumet, and Gina Leinninger

Project Title: The role of central neurotensin signaling in pain

Project Abstract: Chronic pain affects an estimated 30% U.S. adults, causing longer term suffering and decreased quality of life. Currently, the main treatment for pain pathology are drugs classified as opioids. However, opioids are known to cause risk of drug dependency and have limited efficacy. Thus, there is a critical need to define alternative pain treatments that bypass the risk for drug dependency. The neuropeptide neurotensin (Nts) holds promise as a drug target to alleviate pain. We have identified a large

population of Nts-expressing neurons within the lateral hypothalamic area (LHA Nts neurons) that project to the periaqueductal gray area (PAG), a critical area of the inhibitory descending pain system. Therefore, we hypothesize that activating the LHA Nts to PAG circuit is sufficient to produce analgesia in acute and chronic pain as it acts as an endogenous circuit for Nts-mediated pain processing. To assess this, we will use Cre-dependent Designer Receptors Activated by Designer Drugs (DREADDs) in LHA Nts Cre mice. We will determine nocifensive behavior using hot plate and mechanical avoidance test, for thermal and mechanical acute pain respectively. Subsequently, we will induce chronic pain via spared nerve injury (SNI) and determine pain sensitivity using von Frey filaments. Preliminary data shows that activating LHA Nts neurons provides analgesia in a chronic pain model but not in acute pain. Together, this data will reveal the role of neurotensin in central mediated analgesia and how it may be leveraged to safely treat chronic pain via pharmacological manipulation.

Koralee Santiago-Rivera

Research Experience Institution: Michigan State University

Research Mentors: Rabail Khan and Gina Leinninger

Project Title: Role of Neurotensin Receptor-2 Expressing Cells in the Ventral Tegmental Area on Body Weight

Project Abstract: Excess food intake and reduced physical activity drive the obesity pandemic. The neuropeptide neurotensin (Nts) suppresses food intake and promotes locomotor activity via the ventral tegmental area (VTA) of the brain and may have potential to support weight loss. Nts signals via the G-protein coupled receptors neurotensin receptor-1 (NtsR1) or -2 (NtsR2) but it remains unclear if either isoform is preferential for weight loss. Our lab showed that NtsR1 is expressed by VTA neurons that, when activated, promote weight loss. In contrast, NtsR2 is predominantly expressed by astrocytes, so NtsR2-expressing cells may exert distinct contributions to body weight and behavior. We hypothesize that activating VTA NtsR2-expressing cells modulate feeding and locomotor activity to support weight loss, but not via invoking stress or anxiety behaviors. To test this, we injected *NtsR2*^{Cre} mice in the VTA with AAVs to induce Cre-dependent expression of mCherry (controls) or excitatory Designer Receptors Exclusively Activated by Designer Drugs (DREADDq). DREADDs can only be activated by clozapine-N-oxide (CNO), which will activate VTA^{NtsR2} cells "on command". In conclusion, we hypothesize that the activation of VTA NtsR2-expressing cells will promote weight-losing behaviors but have no effect on drinking or anxiety/stress-like behaviors.

Gabrielle Sheets

Research Experience Institution: Louisiana State University Health Sciences Center New Orleans

Research Mentor: Fern Tsien

Project Title: The Effect of Methotrexate Treatment on Neuroinflammation Gene Expression in Pediatric Cancer Patients

Project Abstract: Methotrexate, a structural analogue of folic acid, is one of the most effective and widely used drugs for treating various types of cancer, particularly leukemias and lymphomas. Methotrexate treatment in pediatric patients has been associated with the long-lasting development of detrimental neurological and psychosocial sequela following cancer survival. These deficits, termed late effects, persist after the methotrexate exposure, and may include abnormal behavior such as unusual aggression, problems with executive functioning and processing speed as well as mental disorders like ADHD, depression, and anxiety. Our study includes a retrospective review of neurological and psychosocial evaluations from pediatric cancer survivors enrolled in the Late Effects Clinic at Children's Hospital New

Orleans, Louisiana (CHNOLA). We will also use targeted RNA microarray and bioinformatic analysis of neuroinflammation genes in brain specimens obtained from deceased patients from the Pathology Department at CHNOLA. Results from the present study will provide information regarding gene-environment interactions and thus reveal candidate risk genes and pathways contributing to neurocognitive and psychiatric late effects.

Jermaine Stokes

Research Experience Institution: University of Michigan

Research Mentors: Jena Gewarges

Project Title: Activation of the Ventral Subiculum Decreases Open Field Exploration In Mice

Project Abstract: Hypervigilance, or decreased risk-taking behavior, is a core feature of anxiety disorders in humans. Previous work identified the ventral hippocampus as a neural structure that mediates risk-taking behavior, although the directionality of this control is not consistent across studies. However, little is known about the projections from the ventral hippocampus and how their activation drives risk-taking behaviors in response to a perceived threat. One candidate structure downstream of the ventral hippocampus is the ventral subiculum (vSUB), which receives the majority of its input from the ventral hippocampus. vSUB-lesioned rats showed lower risk-taking behavior, spending less time in the center of a novel open field, and vSUB pyramidal neurons were activated by acute psychological stress. Given this previous work, we hypothesized that vSUB pyramidal cell activity drives risk-taking behavior. Specifically, we expected that chemogenetic activation of vSUB pyramidal neurons would increase exploration of the center in a large, brightly lit open field. In C57Bl/6, 12–15-week-old mice, we injected pAAV-hSyn-hM3D(Gq)-mCherry in the vSUB. After 3 weeks, mice explored a large, brightly lit open field (OFT) for 10 minutes. Twenty minutes preceding the OFT, we intraperitoneally injected either clozapine-N-oxide (to activate the hM3D(Gq)) or Vehicle to all mice. CNO and Vehicle-injected mice showed similar total exploration of the open field, but CNO mice showed less exploration of the center relative to Vehicle-injected mice. CNO-injected mice also made fewer entries into the center relative to Vehicle-injected mice, but there was no difference in time spent in the center between groups. These results show that chemogenetic activation of vSUB pyramidal neurons decreases exploration of the center of an open field and vSUB pyramidal cells decrease risk-taking behavior, contrary to previous lesion studies. These findings may further our understanding of the neural circuitry behind individual differences in the behavioral response to a perceived threat.

Breanna K. Surface

Research Experience Institution: University of Washington

Research Mentors: Jordan Elum and Larry Zweifel

Project Title: Characterizing reward seeking behavior and neural activity in the mesolimbic dopamine system

Project Abstract: How does behavior in mice change across multiple phases of reward-seeking behavior and what is the role of neural activity in the mesolimbic dopamine system during behavior? To examine this, mice were trained on a 12-day behavioral paradigm including cue-induced reinstatement and a progressive ratio task. The first five days consist of an acquisition phase in which mice learn to associate a lever press (action) and audiovisual cue with a natural food reward. Following acquisition, the cue and reward outcomes are omitted following lever pressing. During the reinstatement phase on day 11 only the

cue is presented following lever pressing. During the progressive ratio task, the number of lever presses required for a signal food reward increases throughout the session. During acquisition, mice increase their lever pressing throughout learning and decrease their lever pressing during extinction learning. During reinstatement, mice increase their lever pressing for a reward-associated cue. Additionally, our data shows significant natural variability in lever pressing behavior during each phase of the cue-induced reinstatement and breakpoint level on the progressive ratio task. Additionally, neural activity in mesolimbic dopamine neurons is increased during action, cue, and reward behavioral epochs. Together, our data provide insight into how the mesolimbic dopamine system regulates motivated behavior.

Maria Tello Borja

Research Experience Institution: Washington University in St. Louis

Research Mentor: Tim Holy

Project Title: A Test Towards the Integration of Sniffing and Spatial Navigation in Mice: Evaluating a Topographical Model of Olfaction

Project Abstract: Spatial navigation through the olfactory system is of crucial importance to mice and other rodents that have poor eyesight. It is established that mice conduct repeated sampling, collecting a distribution of odor intensities throughout a region in order to localize where an odor is originating from. However, regarding the additional ways that mice gather information about an odor's position there currently exist two theories of olfaction: the stereo theory states that mice gather data on the difference in concentration of an odor in the initial sniff where their nose is horizontally even and in the second sniff, where their nose is horizontally slanted, to localize an odor; the topographical theory states that mice have anatomical features in their nose that affects how air flows which thus preserves physical space. Currently, the stereo theory of olfaction is widely represented in literature; however, the phenomena that mice are capable of unilateral discrimination of an odor in a ventral, dorsal plane but incapable of unilateral discrimination in a right, left plane, which may be explained by the topographical theory, remains unanswered. In this experiment we plan to test whether (i) mice are capable of discriminating the location of an odor in a single sniff by performing a set of behavioral experiments on head fixed mice, and (ii) whether nose movements affect the accuracy of odor localization by performing behavioral experiments on freely sniffing head fixed mice whose nostrils are paralyzed with lidocaine. Ultimately, addressing these questions will have a profound impact on our understanding of the olfactory system and spatial navigation.

Jennifer Tepan

Research Experience Institution: Vanderbilt University

Research Mentor: Bruce Carter

Project Title: The role of Engulfment Receptor, Jedi-1 in oligodendrocyte lineage cell development.

Project Abstract: Jedi-1 is an engulfment receptor that aids in phagocytosis and clearance of apoptotic debris in the peripheral nervous system. In the central nervous system of Jedi-1 knockout (JKO) mice, phagocytic clearance is disrupted, and proliferation decreases in the subventricular zone (SVZ), a neurogenic niche known for high levels of proliferation and apoptosis. Here, we ask whether Jedi-1 influences oligodendrocyte lineage cell (OLC) development in the corpus callosum (CC). OLCs arise from the SVZ and colonize the CC, where they ensheath and insulate axons, which increases action potential velocity and ensures proper neuronal function. We previously found that in the JKO SVZ, despite a

decreased number of neural precursors, more became OLCs than in wild types (WT) at postnatal day 7 (P7). Thus, we hypothesized that adult JKO mice would have a larger pool of OLCs and proliferating OLCs relative to WT. Immunofluorescent labeling of the oligodendrocyte (OL) lineage marker, Olig2+, in brain sections showed no significant difference of OLCs between genotypes in the corpus callosum at P28. EdU staining, a fluorescent nucleotide analog that labels dividing cells at the time of administration, showed no significant difference in proliferating OLCs. Given this finding, the increase in Olig2+ cells at P7 could represent a transient increase in oligodendrogenesis, perhaps to compensate for the reduction in neural precursors. Understanding the increase in OL production postnatally could provide insight into treatments for demyelinating diseases such as multiple sclerosis.

Isaac Toscano

Research Experience Institution: Washington University in St. Louis

Research Mentors: John Cirrito and Rachel Hendrix

Project Title: Role of orexin in amyloid-Î² peptide production

Project Abstract: Amyloid-β (Aβ) peptide production and accumulation is a driving force of Alzheimer's disease (AD) pathogenesis (Murphy et al, 2010). Moreover, advancing our understanding of Aβ production will give critical insight on AD risk and progression. Previous studies linking sleep and AD have revealed the influence of the sleep-wake cycle on Aβ production; Aβ levels peak during wakefulness and reach their lowest levels during sleep (Kang et. al., 2009). A key modulator of the sleep-wake cycle is the neuropeptide, orexin. Data from the Cirrito lab suggests that orexin plays a potential significant role in Aβ production. Infusion of orexin directly into the brain rapidly increases brain Aβ generation. However, the full pathway of orexin receptor signaling on Aβ production has not been fully documented. Previous data shows that the extracellular regulated kinase (ERK) regulates APP processing into Aβ. We are using SDS-PAGE/Western blots to determine if antagonism of orexin receptors alters the phosphorylation state of ERK, as well as the expression levels of the phosphatase SHP-2, a deactivator of ERK. To monitor orexin protein expression levels of orexin and prepro-orexin, the precursor form which orexin is derived from, will also be assessed. Our results may demonstrate the day-to-day influence of orexin on Aβ production via the sleep-wake cycle as well as underlying cellular mechanisms that influence AD during wakefulness. We anticipate our research to be a starting point for modeling of the orexin signaling pathway on Aβ production to ultimately understand how disrupted sleep and sleep abnormalities influence the disease risk and progression of AD.

Leeanne M. Vázquez-Ramírez

Research Experience Institution: Michigan State University

Research Mentors: Abigail Barrett and Alexa Veenema

Project Title: Role of oxytocin receptors in the sex-specific regulation of social behavior in juvenile rats in the posterodorsal medial amygdala (MePD)

Project Abstract: The oxytocin receptor (OTR) system is a crucial component for the regulation of a broad range of social behaviors in males and females across a variety of species. Sex differences in OTR binding density in brain regions implicated in the regulation of social behavior, termed the social behavior neural network (SBNN), have been observed in both juvenile and adult rats. The posterodorsal medial amygdala (MePD) is a brain region within the SBNN that is involved in the regulation of different social behaviors,

such as social recognition, mating and aggression. Our recent findings have shown a significantly higher OTR binding density in MePD of juvenile and adult male rats in comparison with female rats. Thus, we sought to determine whether cells in the MePD that express OTR are activated in a sex-specific manner in juvenile rats following exposure to a social stimulus. We hypothesized that male rats will have higher OTR activation in the MePD after a social stimulus. Single-housed juvenile (five-week-old) male and female rats were exposed in their home cage to either a three-week-old sex-matched rat (social stimulus) for ten minutes or were left alone (no social stimulus). Brain sections were processed using fluorescent in situ hybridization to count the number of cells expressing OTR mRNA and cFos mRNA, a marker for neuronal activation, and the number of cells expressing both within the MePD. This study will further our understanding of the role of the OTR system in the sex-specific regulation of social behaviors at a juvenile age.

Sandy Vang

Research Experience Institution: University of Colorado Anschutz Medical Campus

Research Mentors: Laetitia Merle and Diego Restrepo

Project Title: Role of microvillous cells in the olfactory epithelium in response to viral infection investigated through optogenetic stimulation

Project Abstract: The COVID-19 pandemic has shed light on post-viral loss of smell, but the response of the olfactory epithelium (OE) during viral infection remains unclear. The OE harbors olfactory sensory neurons (OSNs) that detect odorants, sustentacular cells which provide physical and functional support to OSNs, basal stem cells that ensure constant renewal of the OE and regeneration in case of injury, and microvillous cells (MVCs). The role of MVCs is not clearly defined. They express TRPM5 and ChAT, two key elements found in chemosensory cells of the airway and intestinal epithelium, which have been implicated in immune and inflammatory responses to bacterial, viral, and parasitic infection. Through transcriptional profiling, it's suggested that MVCs in the OE are likely to defend against pathogens, however, mechanisms of how this happens are not known. We hypothesize two possible pathways through which MVCs elicit an antiviral response: (1) recruitment of macrophages to release pro-inflammatory cytokines and eliminate infected cells; (2) activation of cell division in horizontal basal cells (HBCs) to replace the injured OE cells. In the present research, we used mice expressing the channelrhodopsin channel (ChR2) under the ChAT promoter to optogenetically stimulate MVCs and investigate the consequences on macrophages recruitment and HBCs proliferation. Our results suggest an increase in proliferation in OE basal cells in ChAT-ChR2 mice compared to wild-type mice. Furthermore, no apparent difference in macrophage recruitment was seen between ChAT-ChR2 and wild-type mice. This study reveals a potential interaction between MVCs and HBCs during viral infection to repair virus-induced cell damages.

Zixian Wang

Research Experience Institution: Brown University

Research Mentor: David Sheinberg

Project Title: Effects of scene familiarity and similarity on eye movements

Project Abstract: Eye saccade is an unconscious eye movement. Under rapid eye movement, eyes will shift to focus on an image. Through studying the saccade movement, we can understand cognitive neural works. Under clinical settings, early detection methods of neurodegenerative diseases such as Alzheimer's

are still under research. Eye saccades have the potential to be a new biomarker for neurodegenerative disease detection and tracking. This research can also provide valuable data for criminal interrogation. Previous research about face recognition indicate human take less reaction time (RT) and conduct less saccade rate under familiar face recognition. In clinical setting Alzheimer's patients lose their ability to recognize the surrounding environment. In our research, we measure the Saccade pattern of primate under scenes of different familiarities. Our research focuses on observing eye Saccade pattern of familiar and similar scene recognition in primate. Based on previous research result from facial recognition in human. We use scene background stimuli and test primates' ability to search for an object in the background. Familiarity was tested with a task of searching stimulation signal under familiar backgrounds. Under background of familiar and unfamiliar scenes, primates' Saccade will be measured and analyzed. Backgrounds are grouped into different scene categories. Familiar and unfamiliar background random choose from different categories. Instead of familiarity, similarity was Poorly researched in eye Saccade. As familiar background builds up a short-term memory in primate. A similar background is going to distract the primate to recall that memory.

Julián David Welsh

Research Experience Institution: University of Colorado Anschutz Medical Campus

Research Mentors: Emily Gibson, Stephanie Meyer, and Diego Restrepo

Project Title: Stage setup for in vivo neuroimaging of anesthetized mice using inverted STED super resolution microscopy

Project Abstract: STED (STimulated Emission Depletion) microscopy is a type of super resolution imaging that is often used in neuroscience because it can resolve dendritic spine details in live cells or animals that are impossible to see with diffraction-limited microscopy. We want to image live mice on our custom STED microscope. However, we require a mouse-mounting stage for our inverted microscope stand to hold the mouse in a stable prone position and allow tuning of the x, y position and tip/tilt of the coverslip. The stage consists of a top layer attached to an upside-down mounted goniometer, a bottom layer with a window for the objective lens, and a central plate attached to the goniometer with a head bar to hold the mouse's head stable and straps to keep the mouse's body attached to the plate and immobile. The goniometer is crucial to this design, as it allows the mouse to be tilted in two different planes so that the coverslip can be set perpendicular to the optical axis of the objective to minimize optical aberrations.

KG Williams

Research Experience Institution: Washington University in St. Louis

Research Mentors: Todd Braver, Erik Herzog, and Diana Jose-Edwards

Project Title: Determining fronto-striatal circuitry as a mediator of age effects in emotion regulation: Mechanisms of Age-related Cognitive Control

Project Abstract: Emotion regulation (ER) is a mental faculty important for self-control and promoting psychological equilibrium and wellness. Our study focuses on the ER strategy cognitive reappraisal (CR), which involves reinterpreting stimuli in a manner that is less stimulating of negative emotion. Recent research has indicated that cognitive control (CC) is associated with ER, with emerging evidence that they share prefrontal cortex circuitry. Yet the incentive of emotional equilibrium driving ER implicates the faculties of motivation in ER, such as the brain's "appraisal systems" (e.g., ventral striatum). A goal of this

research is to better understand the neural mechanisms of ER and CC and what patterns of brain activity reflect healthful mental functioning. Previous research has studied young adults to determine the processes of ER and CC. We will expand our study to include older adults to investigate the contradictory relationship between ER and CC: despite sharing circuitry, aging is associated with cognitive decline, yet recent research suggests older adults possess superior ER and a positivity bias. We hypothesize an effect of age on ER performance that can be explained by differences in fronto-striatal activation and connectivity. Our study pilots an ER behavioral task to record one's affect in response to negative images when not practicing ER versus using a CR technique—minimizing or positive reappraisal. The data from this pilot will reveal if an effect of age produces different ER performance results between younger and older adults before proceeding to the scanning phase, using fMRI to determine the underlying brain activity while performing the task.

Justin Woods

Research Experience Institution: Washington University in St. Louis

Research Mentors: Ream Al-Hasani and Marwa Mikati

Project Title: Reward seeking during punishment risk in naloxone-precipitated fentanyl withdrawal

Project Abstract: The kappa opioid receptor system has been implicated in the negative affective state associated with opioid withdrawal. This negative affective state includes increased anxiety-like behavior that has thus far been difficult to reliably measure during withdrawal. The aim of this study was to determine whether performance in the punishment risk task (PRT), a novel behavioral assay that has been used to measure risk-taking and anxiety-like behavior in rats, is altered during naloxone-precipitated fentanyl withdrawal in mice. Our goal is to validate the PRT as a model to better determine anxiety-like and risk-taking behavior in a model of fentanyl withdrawal. Mice were first trained in a modular test chamber that administered a sucrose reward for each successful nose poke in a small hole located near the sucrose dispenser. Following training, mice were tested in the same chamber through the PRT, where each nose poke, along with a sucrose reward, resulted in a chance to be shocked. This shock probability increased along three blocks, where each block was separated by the successful collection of 15 pellets. Baseline tests were performed prior to fentanyl exposure, testing again during fentanyl exposure, and a final test was conducted following naloxone administration to examine the effects of withdrawal. During exposure testing, subjects that had received fentanyl showed increased latency, otherwise known as the time, they took to correctly nose poke for a reward following being shocked, when compared to saline controls (block 2: $p < 0.005$, block 3: $p < 0.001$). During withdrawal, we see a reversal of this effect in the final block of the PRT, where the fentanyl-naloxone group had a decreased latency to nose poke when compared to the fentanyl-saline group ($p < 0.0001$). Additionally, we found that the saline-naloxone group had decreased latency to nose poke when compared to fentanyl-saline group ($p < 0.002$). Out of the 19 mice used in the experiment, 18 of them successfully made it to block 3, indicating that they comprehend the mechanism behind successfully attaining the sugar reward. Additionally, testing data showed mice have an increase in their latency to nose poke through successive blocks potentially indicating that they understand the risk associated with successive sucrose retrieval. Naloxone precipitated withdrawal is also shown to increase risk taking behavior through a naloxone-mediated mechanism.

RECRUITMENT FAIR PARTICIPANTS

Booth	INSTITUTION & Program	Program Representative(s)
1	**BRANDEIS UNIVERSITY** **Neuroscience Program**	**Susan Birren, Ph.D.** Zalman Abraham Kekst Professor in Neuroscience Program Head **Norelis Diaz-Rodriguez** Doctoral Student **Leslie Griffith, M.D., Ph.D.** Nancy Lurie Marks Professor of Neuroscience Director of the Volen National Center for Complex Systems **Jared Newell** Doctoral Student
2	**BROWN UNIVERSITY** **Neuroscience Graduate Programs**	**Kelsey Babcock** Doctoral Student **Rachel McLaughlin** Doctoral Student
3	**COLUMBIA UNIVERSITY** **Graduate Program in Neurobiology and Behavior**	**Amanda Anqueira** Doctoral Student **Mike Cohanpour** Doctoral Student **Aniruddha Das, Ph.D.** Associate Professor of Neuroscience Director for Diversity of the Graduate Program **Camila Demaestri** Doctoral Student **Darcy B. Kelly, Ph.D.** Harold Weintraub Professor of Biological Sciences Program Co-Director **Wesley B. Grueber, Ph.D.** Professor of Neuroscience Program Co-Director **Briana McRae** Doctoral Student **Kenneth D. Miller, Ph.D.** Professor of Neuroscience Program Co-Director **Lisa Randolph** Doctoral Student

		Francisco Salema Oom de Sacadura Doctoral Student **Jasmine Stone** Doctoral Student **Sharon Su** Doctoral Student
4	DREXEL UNIVERSITY COLLEGE OF MEDICINE **Graduate Program in Neuroscience**	**Jessica Barson, Ph.D.** Chair of Admissions and Recruitment for Ph.D. Students **Taylor McCorkle** Doctoral Student **Ramesh Raghupathi, Ph.D.** Professor of Neurobiology & Anatomy Program Deputy Director
5	EMORY UNIVERSITY **Neuroscience Graduate Program**	**Javier Jarildy** Doctoral Student **Alicia Lane** Doctoral Student Co-chair of the Diversity, Equity, and Inclusion Committee **Yoland Smith, Ph.D.** Professor of Neurology Program Director
6	GEORGETOWN UNIVERSITY **Interdisciplinary Program in Neuroscience**	**Ismary Blanco** Doctoral Student **Danna O. Cunningham** Doctoral Student **Kathy Maguire-Zeiss, Ph.D.** Professor of Neurology Program Director **Ludise Malkova, Ph.D.** Professor of Pharmacology Admissions Director **William Rebeck, Ph.D.** Professor of Neuroscience **John VanMeter, Ph.D.** Associate Professor of Neurology Student Advisor

7	HARVARD MEDICAL SCHOOL Program in Neuroscience	**John Assad, Ph.D.** Professor of Neurobiology Program Director **Taralyn Tan, Ph.D.** Director of Education
8	ICAHN SCHOOL OF MEDICINE AT MOUNT SINAI Ph.D. in Neuroscience Program	**Ashley Cunningham** Doctoral Student **George Huntley, Ph.D.** Professor of Neuroscience Program Director
9	JOHNS HOPKINS UNIVERSITY Neuroscience Training Program	**Jay Baraban, M.D., Ph.D.** Professor of Neuroscience Co-Chair for the Committee on Diversity and Inclusion
10	LOUISIANA STATE UNIVERSITY HEALTH SCIENCES CENTER NEW ORLEANS Biomedical Alcohol Research Training Program	**Scott Edwards, Ph.D.** Associate Professor of Physiology and Neuroscience T32 Associate Director
11	NATIONAL INSTITUTES OF HEALTH NIH Oxford-Cambridge Scholars Program	**Kristi M. Porter, Ph.D.** Executive Director
12	NEW YORK UNIVERSITY Neuroscience Graduate Program	**Christine Constantinople, Ph.D.** Assistant Professor of Neural Science **Jeremy Dasen, Ph.D.** Professor of Neuroscience and Physiology **Andre Fenton, Ph.D.** Professor of Neural Science **Houda Khaled** Doctoral Student **Michael Long Ph.D.** Associate Professor of Neuroscience and Physiology **Holly Wasserman, Ed.D.** Program Manager of the Neuroscience Institute
13	NORTHWESTERN UNIVERSITY Northwestern Interdepartmental Neuroscience Program	**Jena Pitman-Leung, Ph.D.** Assistant Program Director **Stephanie Valtierra, Ph.D.** Senior Program Coordinator **Cassandra VanDunk, Ph.D.** Assistant Director of the NU PREP

14	OREGON HEALTH & SCIENCE UNIVERSITY **Neuroscience Graduate Program**	**Omar Koita** Doctoral Student **Kelly Monk, Ph.D.** Senior Scientist at the Vollum Institute Program Co-Director **Jessica Parks, M.Ed.** Program Administrator
15	THE PENNSYLVANIA STATE UNIVERSITY **Cross Disciplinary Neural Engineering Training Program**	**Bruce Gluckman, Ph.D.** Professor of Engineering Science and Mechanics, Neurosurgery, and Biomedical Engineering Associate Director of the Penn State Center for Neural Engineering **Dezhe Jin, Ph.D.** Associate Professor of Physics
16	PRINCETON UNIVERSITY **Princeton Neuroscience Institute**	**Max Aragon** Doctoral Student **Nathaniel Daw, Ph.D.** Huo Professor in Computational and Theoretical Neuroscience **Edwin Clayton, Ph.D.** Senior Project Manager **Alex Michaud** Graduate Administrator **Fred Uquillas** Doctoral Student
17	RUTGERS UNIVERSITY **Graduate Program in Neuroscience**	**Janet Alder, Ph.D.** Associate Professor of Neuroscience and Cell Biology Assistant Dean for Graduate Academic and Student Affairs **Emmanuel Alvarez** Doctoral student **Ileana Fuentes** Doctoral Student **Ivan Linares** Doctoral Student **M. Maral Mouradian, M.D.** William Dow Lovett Professor of Neurology Founding Director of the RWJMS Institute for Neurological Therapeutics T32 Program Director **John Pintar, Ph.D.**

		Professor of Neuroscience and Cell Biology Program Director **Brandon Sanabria** Doctoral Student
18	STANFORD UNIVERSITY **Neurosciences Interdepartmental Program**	**Kalai Diamond** Educational Program Director **Lucas Encarnacion-Rivera** Doctoral Student **Marrium Fatima** Student Services Officer **Justin Gardner, Ph.D.** Associate Professor of Psychology **Victoria Hernandez** Doctoral Student **Garam Kim** Doctoral Student **Merritt Maduke, Ph.D.** Associate Professor of Molecular & Cellular Physiology
19	TEMPLE UNIVERSITY **Neuroscience Graduate Training Programs**	**Lisa Briand, Ph.D.** Associate Professor of Psychology **Andre Toussaint** Doctoral Student **Ellen Unterwald, Ph.D.** Chair and Professor of Neural Sciences Director and Professor of the Center for Substance Abuse Research
20	UNIVERSITY OF CALIFORNIA BERKELEY **Neuroscience Ph.D. Program**	**Dan Feldman, Ph.D.** Professor of Neurobiology T32 Director **Candace Groskreutz** Graduate Program Manager **Michael Silver, Ph.D.** Professor of Vision Science, Optometry and Neuroscience Program Director

21	UNIVERSITY OF CALIFORNIA DAVIS Neuroscience Graduate Program	**Ashley Hodel, Ph.D.** Academic Coordinator **W. Martin Usrey, Ph.D.** Chair and Professor of Neurobiology, Physiology & Behavior Director of the Basic Neurosciences Training Grant
22	UNIVERSITY OF CALIFORNIA LOS ANGELES Training in Neurotechnology Translation	**Carlos Portera-Cailliau, M.D., Ph.D.** Professor of Neurology and Neurobiology
23	UNIVERSITY OF CALIFORNIA SAN FRANCISCO Neuroscience Ph.D. Program	TBD
24	UNIVERSITY OF CINCINNATI Neuroscience Graduate Program	**Steve Davidson, Ph.D.** Assistant Professor of Anesthesiology Associate Program Director **Renu Sah, Ph.D.** Associate Professor of Pharmacology and Systems Physiology Program Director
25	UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS Neuroscience Graduate Program	**Dan Denman, Ph.D.** Assistant Profess of Physiology and Biophysics **Abigail Person, Ph.D.** Associate Professor of Physiology and Biophysics Program Co-Director **Nathan Schoppa, Ph.D.** Professor of Physiology and Biophysics Program Co-Director **Deanne Sylvester** Program Administrator
26	UNIVERSITY OF IOWA Interdisciplinary Graduate Program in Neuroscience	**Jonathan Doorn, Ph.D.** Division Head and Professor of Pharmaceutical Sciences and Experimental Therapeutics **Emma Thornburg** Doctoral Student **Ellen van der Plas, Ph.D.** Assistant Professor of Psychiatry

27	UNIVERSITY OF MARYLAND SCHOOL OF MEDICINE **Program in Neuroscience**	**Mary Kay Lobo, Ph.D.** Associate Professor of Anatomy and Neurobiology Program Diversity Committee Chair **Brian Mathur, Ph.D.** Associate Professor of Pharmacology Director of Graduate Education **Jessica Mong, Ph.D.** Associate Professor of Department of Pharmacology T32 Director **Georgia Rogers, Ph.D.** Program Manager
28	UNIVERSITY OF MICHIGAN **Biomedical Engineering**	**Tim Bruns, Ph.D.** Associate Professor of Biomedical Engineering Associate Chair for Graduate Education
29	UNIVERSITY OF MICHIGAN **Neuroscience Graduate Program**	**Richard Altschuler, Ph.D.** Professor of Otolaryngology-Head and Neck Surgery **Shelly Flagel, Ph.D.** Associate Professor of Psychiatry Assistant Director for Admissions **Katie Furman** Doctoral Student ENDURE Alum **Audrey Seasholtz, Ph.D.** Professor of Biological Chemistry Interim Program Director
30	UNIVERSITY OF MINNESOTA **Graduate Program in Neuroscience**	**Geoffrey Ghose, Ph.D.** Professor of Neuroscience Program Chair of Recruitment **Bethany Stieve** Doctoral Student Program Recruitment Committee Member
31	UNIVERSITY OF PITTSBURGH **Center for Neuroscience**	**Jenelle Collier** Doctoral Student **Jordan Gregory** Doctoral Student **Robert Turner, Ph.D.** Professor of Neurobiology Program Co-Director

32	UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER SAN ANTONIO Neuroscience Graduate Program	Heather Hunter Program Coordinator Dan Lodge, Ph.D. Professor of Pharmacology Assistant Program Director Admissions Committee Representative David Morilak, Ph.D. Professor of Pharmacology Director of the Center for Biomedical Neuroscience Program Director
33	UNIVERSITY OF UTAH Neuroscience Ph.D. Program	Sophie Caron, Ph.D. Assistant Professor of Biological Sciences Program Recruitment Co-Chair Jeanette Ducut-Sigala, Ph.D. Manager of Diversity & Inclusion Health Science Training Programs Jim Heys, Ph.D. Assistant Professor of Neurobiology Program Recruitment Co-Chair
34	UNIVERSITY OF VIRGINIA Brain Immunology and Glia Training Program	Tajie Harris, Ph.D. Associate Professor of Neuroscience T32 Co-Director Sarah Kucenas, Ph.D. Professor of Biology T32 Co-Director
35	UNIVERSITY OF WASHINGTON Graduate Program in Neuroscience	Horacio de la Iglesia, Ph.D. Professor of Biology Program Co-Director Kyle Shea Graduate Program Advisor
36	VANDERBILT UNIVERSITY Neuroscience Graduate Program	Rebecca Ihrie, Ph.D. Associate Professor of Cell and Developmental Biology and Neurological Surgery Danny G. Winder, Ph.D. Bixler-Johnson-Mayes Professor of Molecular Physiology & Biophysics, Pharmacology, and Psychiatry Director of the Vanderbilt Center for Addiction Research Associate Director for Graduate Training in the Medical Scientist Training Program

37	WAKE FOREST SCHOOL OF MEDICINE Neuroscience Program	**Brianna George** Doctoral Student **Rachel Jones** Doctoral Student **Carol Milligan, Ph.D.** Professor of Neurobiology and Anatomy Director of the Graduate Programs in Neuroscience **Hope Peterson** Doctoral Student **Scott Smyre** Doctoral Student
38	WASHINGTON UNIVERSITY IN ST. LOUIS Program in Neuroscience	**Timothy E. Holy, Ph.D.** Alan A. and Edith L. Wolff Professor of Neuroscience Program Co-Director **Celeste Karch, Ph.D.** Associate Professor of Psychiatry Chair of Admissions Committee **Daniel Kerschensteiner, M.D.** Professor of Ophthalmology and Visual Sciences Vice Chair for Research Program Co-Director **Julia Pai** Doctoral Student ENDURE Alumna **Sally Vogt** Graduate Student Coordinator
39	WASHINGTON UNIVERSITY IN ST. LOUIS Cognitive, Computational and Systems Neuroscience	**Todd Braver, Ph.D.** Professor of Psychological & Brain Sciences, Radiology, and Neuroscience T32 Program Director
40	YALE UNIVERSITY Interdepartmental Neuroscience Program	**Charles A. Greer, Ph.D.** Professor of Neurosurgery and Neuroscience Co-Vice Chair of Research, Neurosurgery Program Director

GRADUATE PROGRAM DESCRIPTIONS

BRANDEIS UNIVERSITY

Neuroscience 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 Ph.D. 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 jtheriault@brandeis.edu.

Application deadline: December 1, 2021

Application fee waivers: Participants in ENDURE can use "ENDURE21" for an application fee waiver.

GRE: The GRE is not required.

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, 2021

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.

GRE: The GRE is not required.

COLUMBIA UNIVERSITY

Graduate Program in Neurobiology and Behavior | http://www.neurosciencephd.columbia.edu/

Program Description: The goal of Columbia's Doctoral Program in Neurobiology and Behavior is to produce insightful and creative thinkers who can contribute effectively to an increasingly rich and diverse future of

neuroscience. The Program currently has 94 Ph.D. and M.D./Ph.D. students including an entering 2021 class of 14 Ph.D. candidates, of whom 43% belong to underrepresented groups (vs. an average of 23% across the years). Our students' undergraduate training ranges from liberal arts colleges to universities across the US and abroad. Training in the Program aims to provide a broad knowledge base as well as the analytical skills required for innovative, rigorous, reproducible, and trans-disciplinary research with links to translational initiatives. Training starts with research rotations, core and elective courses, and a qualifying exam for advancement to Ph.D. candidacy. More advanced students participate in research-in-progress presentations and thesis committee meetings, workshops on proposal and paper writing, professional skills and leadership instruction, culminating in the thesis defense. Columbia's Doctoral Program in Neurobiology and Behavior offers students the opportunity to choose, with guidance, from a large number of research areas and approaches with over 130 mentors from 14 departments. Our broadly-based faculty also provide opportunities to explore the potential for sciences allied to neuroscience (biophysics, engineering, mathematical statistics, bioinformatics, structural biology, cognitive studies) to catalyze new ways of thinking about how neurons function, how the brain responds to and generates behavior, and changes across the lifespan and in response to challenges and disease. After the Ph.D. students embark on a variety of research-intensive career paths as well as science policy, biotech and data science and other science-related positions.

Application deadline: December 1, 2021

Application fee waivers: Application fees are waived for: (1) U.S. citizens or permanent residents currently enrolled in a U.S. college/university who demonstrate financial need. Please provide a letter verifying your Estimated Family Contribution (EFC) signed by a financial aid officer at the institute you currently attend; (2) participants in the following programs: AmeriCorps, Bill and Melinda Gates Millennium Scholar, Leadership Alliance Summer Research Early Identification Program, MARC, RISE, NIH PREP, Peace Corps, Teach for America, etc. Please provide a letter from the program officer confirming your participation in the program; and (3) applicants who are currently serving in the US military. Please email your request to BiomedicalSciences@cumc.columbia.edu.

Information regarding COVID-19: Our current plan for Admissions includes an in-person Open House and applicant interviews with Faculty members. These plans will be re-evaluated closer to the scheduled date and will follow relevant N.Y. State, N.Y. City, and Columbia University COVID-19 guidelines.

Additional Information: R&D: Research and Diversity https://kelleylab.biology.columbia.edu/news/rd-research-and-diversity

DREXEL UNIVERSITY COLLEGE OF MEDICINE

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

Program Description: The Graduate Program in Neuroscience is a collaborative training community centered in the Drexel University College of Medicine. Our students come from around the country and the world and typically have undergraduate degrees in biology, biochemistry, neuroscience, psychology, or physiology. With a commitment to excellence, we prepare students for success in various careers across academia and industry. Our graduates are employed as faculty, policy advisors, federal government researchers and medical/scientific writers. Our graduate program offers a research-intensive training experience that emphasizes critical thinking, state-of-the-art techniques and communication. We offer both M.S. and Ph.D. degrees.

For more information, email rr79@drexel.edu.

Application deadlines: Dec 15, 2021 for Ph.D.; rolling until July 15, 2022 for M.S.

Application fee waivers: Waived on request to the program director.

GRE: The GRE is not required.

Information regarding COVID-19: All incoming students need to show proof of vaccination. Current students, faculty, and staff are required to be vaccinated. COVID tests are offered on site. Classes are held in person with the option of remote synchronous sessions.

EMORY UNIVERSITY

Graduate Program in Neuroscience | 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. A total of 101 Ph.D. students including 25% from under-represented minority groups, are currently enrolled in the Emory Graduate Neuroscience program. Over 90% of trainees who completed their Ph.D. 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.

For more information, email ysmit01@emory.edu.

Application deadline: December 1, 2021

Application fee waivers: Application fees can be waived for students historically underrepresented in the sciences.

GRE: The GRE is not required.

Information regarding COVID-19: The safety of Emory students and faculty is a top priority for the institution. Policies have been put in place to ensure that students can pursue their graduate training while following basic rules to ensure their safety and that of others (required mask, vaccination, regular COVD19 testing, etc.). For more details about Emory policies regarding COVID-19, see https://www.emory.edu/forward/.

GEORGETOWN UNIVERSITY

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

Program Description: The Ph.D. in Interdisciplinary Program in Neuroscience (IPN) has existed since 1994. With faculty from more than 10 departments across Georgetown, the IPN program encourages interdisciplinary collaboration and approaches toward research. IPN is highly ranked in the National Research Council's rankings of U.S. graduate programs in Neuroscience.

IPN has ~50 Ph.D. students investigating topics ranging from glial activation, neuron signaling, and dendritic spine plasticity, to mechanisms of Parkinson's disease, Alzheimer's disease, and traumatic brain injury, to systems of face recognition, word reading, and interpretation of sounds. Our Ph.D. students actively participate in organizing our program and teaching courses, and they have an excellent record of

publishing manuscripts and receiving grants. Georgetown University also offers a MS in Integrative Neuroscience, providing students with a comprehensive neuroscience education.

Our faculty members are from various departments at Georgetown University and neighboring institutions. We have strong programs in neurodegeneration, examining molecular mechanisms of pathogenic processes, and cognitive neuroscience, investigating development, language, memory, social interactions, and impairments of these systems. A specific training program is available for students interested in neural injury and plasticity and translational biomedical science. It is also possible for our students to apply for a concentration in cognitive science.

Our mission is to educate students to be excellent neuroscientists, lifelong learners, and responsible, active participants in the global scientific community. The success of our alumni in diverse scientific career paths gives us great pride and demonstrates their commitment to be stewards of the discipline of neuroscience while living generously in service to the community.

For more information, email km445@georgetown.edu.

Application deadline: December 1, 2021

Application fee waivers: Contact the Biomedical Graduate Education for information on fee waivers.

GRE: The GRE is not required.

Information regarding COVID-19: We are complying will all of the DC COVID-19 regulations; this Fall semester we are in-person. We offer free COVID-19 testing and vaccines.

HARVARD UNIVERSITY MEDICAL SCHOOL

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

Program Description: The Harvard Ph.D. 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 Ph.D. 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.

Application deadline: December 1, 2021

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

GRE: The GRE is not required.

Information regarding COVID-19: We do not expect COVID-19 to affect our admitted class size for fall 2022.

Additional information: For more information about Harvard PiN, the application process, and recruitment events for 2021, visit https://bit.ly/3x46NNp.

ICAHN SCHOOL OF MEDICINE AT MOUNT SINAI

Ph.D. in Neuroscience Program | https://icahn.mssm.edu/education/phd/neuroscience

Program Description: Mount Sinai's Neuroscience Ph.D. program provides multidisciplinary and highly collaborative research training in basic, translational, and clinical neuroscience. Ranked 2nd nationally in NIH funding, the Neuroscience department and Graduate program leverage partnerships with the School of Medicine, the Mount Sinai Hospital and Health System, and other Institutions to provide extraordinary diversity of scientific and clinical strengths ranging from structure/function analysis of individual synapses, to computational modeling of gene, protein and connectivity networks in healthy and diseased brains, to behavioral, electrophysiological and imaging studies of a variety of organisms, including humans. Graduate students participate in an integrated program of Core and advanced courses and includes a course with direct patient contact. Trainees in our program are fully supported financially, and benefit from numerous activities that enhance their research and training experience, including science theme-based Clubs, seminars, career development opportunities, teaching and peer-mentoring activities, an annual retreat, and other cohesion-building events.

For more information, email george.huntley@mssm.edu.

Application deadline: December 1, 2021

Application fee waivers: Fee waivers for veterans and applicants participating in underrepresented student educational programs (e.g., McNair Scholars, HEOP, etc.). Waiver for need-based financial hardship also eligible-contact admissions@mssm.edu.hardship.

GRE: The GRE is not required.

Information regarding COVID-19: In-person admission events in January 2022 (for Fall, 2022 matriculation) is planned as of September 2021, but this is subject to change.

JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE

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

Program Description: The Department of Neuroscience is committed to providing a welcoming and nurturing environment for all students. Please visit our website for more information or email Hita Adwanikar, hita@jhu.edu.

For more information, email.

Application deadline: December 1, 2021

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

GRE: The GRE is not required.

LOUISIANA STATE UNIVERSITY HEALTH SCIENCES CENTER NEW ORLEANS

Biomedical Alcohol Research Training Program | https://www.medschool.lsuhsc.edu/physiology/biomedical_training_description.aspx

Program Description: The NIAAA-sponsored Biomedical Alcohol Research Training Program prepares graduate students seeking a Ph.D. degree and postdoctoral fellows interested in careers as independent scientists. We have accomplished faculty with extensive experience in mentoring aspiring scientists that have academic appointments across the LSU Health Sciences Center in New Orleans. Alcohol research opportunities that trainees are pursuing include but are not limited to the following: molecular and behavioral neuroscience of alcohol use disorder (AUD), pain, and stress-induced drinking; innate and acquired immune system function and dysfunction; HIV/AIDS (prevention, transmission, pathogenesis, progression, therapy); neuroendocrine mechanisms in the regulation of AUD-related neurobiology and pathophysiology; stem cell biology in infection and tissue repair; psychosocial determinants of health and epidemiology. Trainees also participate in didactic sessions designed to develop their knowledge base in the alcohol research field as well as their written and oral communication skills. The goal of the program is

to provide mentorship and focused training so that young M.D. and Ph.D. scientists can become familiar with the biomedical problems related to excessive alcohol consumption and acquire the tools to perform high quality, competitive research. Successful applicants will work in a highly collaborative environment located within the heart of New Orleans and receive an NIH-level stipend.

For more information, email sedwa5@lsuhsc.edu.

Application deadline: Rolling deadlines

Application fee waivers: Please contact us for fee waiver.

GRE: The GRE is not required.

Information regarding COVID-19: We are following all CDC guidelines.

NATIONAL INSTITUTES OF HEALTH

NIH Oxford-Cambridge Scholars Program | https://oxcam.gpp.nih.gov/

Program Description: The NIH Oxford-Cambridge (OxCam) Scholars Program is a highly individualized doctoral program for students seeking to pursue a career in biomedical research. OxCam students partner with Investigators at the NIH and the University of Oxford or Cambridge to perform a single, collaborative dissertation project. Since the program is based on the British University system, students are not required to take coursework nor conduct laboratory rotations. As such, OxCam students are able to complete a doctoral degree in approximately four years. Each student divides the time evenly between the two laboratories, with approximately two years at the NIH and two years in the UK.

Students interested in pursuing a career as a physician-scientist may pair the OxCam Scholars Ph.D. Program with a U.S. medical program via the NIH M.D./Ph.D. Partnership Training Program. Since the NIH does not grant M.D. or Ph.D. degrees, the program partners with U.S. medical schools during the student's M.D. phase of training, and with universities in the United States and the UK for the Ph.D. phase of training. Students who have finished their Bachelor's degrees and are applying to medical school as well as students who are currently enrolled in medical school are eligible to apply.

Application deadline: December 1, 2021

Application fee waivers: N/A

GRE: The GRE is not required.

NEW YORK UNIVERSITY

Neuroscience Program | https://neuroscience.nyu.edu

Program Description: NYU neuroscience arises from two cooperative centers located just a few city blocks apart in NYC: The Center for Neural Science (CNS) and the Neuroscience Institute (NI). CNS, located at NYU's Washington Square campus, is home to core neuroscience labs, has affiliate labs in biology, psychology, physics and data science, and is NYU's portal for undergraduate neuroscience education. The NI is located at NYU's School of Medicine and houses additional core neuroscience labs, as well as affiliates from clinical departments and the Nathan Kline Institute. Together, CNS and NI serve as the joint pillars of graduate training in neuroscience at NYU, with research spanning genetic, molecular, cellular, developmental, systems, behavioral, and computational levels. Prospective graduate students apply through a single online portal and applications are jointly reviewed by a single admissions committee that spans CNS and NI.

For more information, email Holly Wasserman, Holly.Wasserman@nyulangone.org.

Application deadline: December 1, 2021

Application fee waivers: NYU does offer application fee waivers in certain circumstances. Visit https://gsas.nyu.edu/content/nyu-as/gsas/admissions/gsas-application-resource-center/nyu-gsas-general-application-policies.html#2 for more information.

GRE: The GRE is not required.

NORTHWESTERN UNIVERSITY

Northwestern Interdepartmental Neuroscience Program | https://www.nuin.northwestern.edu/

Program Description: Northwestern University offers world-class advanced training in neuroscience via its Interdepartmental Neuroscience (NUIN) Ph.D. 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.

For more information, email NUIN@northwestern.edu.

Application deadline: December 1, 2021

Application fee waivers: The Graduate School (TGS) provides fee waivers on a first-come, first serve basis to eligible applicants who meet. For more information, visit https://www.tgs.northwestern.edu/admission/application-procedures/application-requirements/fee.html.

GRE: The GRE is not required.

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 53 predoctoral students and more than 140 faculty in a broad range of subdisciplines. The program is intended for students planning a career in academic or industry research, but we encourage student to explore the career path that matches their ambitions and expertise. The program is particularly strong in cellular neuroscience, neuronal signaling, gene regulation, biophysics of channels and transporters, sensory systems, and neuroendocrinology with increasing strength in developmental neuroscience and disease-oriented neuroscience research. Faculty members are located within research institutes at OHSU including the Vollum Institute, the Oregon National Primate Research Center (ONPRC), Oregon Hearing Research Center, Jungers Center, and the Oregon Institute for Occupational Health Sciences, as well as the basic and clinical departments in the OHSU School of Medicine.

For more information, email parksjes@ohsu.edu.

Application deadline: December 1, 2021

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

GRE: The GRE is not required.

Information regarding COVID-19: We understand that COVID-19 has created significant and unique challenges for prospective students. Our admissions committee reaffirms its commitment to a holistic application review process. Most importantly, we will respect decisions regarding the adoption of Credit/No Credit and other grading options during this unprecedented period of COVID-19 disruption, whether they are made by institutions or by individual students. Our goal remains to form an NGP cohort from a diversity of perspectives, backgrounds, and experiences that enrich the graduate educational experience.

Additional Information: Learn more about the program, the application process, and what the committee is looking for in a good application, consider attending one of two Neuroscience Graduate Program Admissions Sessions.

- **October 12, 2021 from 10:00-11:00 a.m. P.T.** To register, visit https://ohsu.ca1.qualtrics.com/jfe/form/SV_3QxXfh7BWMrm7ZQ
- **November 3, 2021 from 12:00-1:00 p.m. P.T.** To register, visit https://ohsu.ca1.qualtrics.com/jfe/form/SV_0iUDnMPDdHYHBnE

THE PENNSYLVANIA STATE UNIVERSITY

Cross-Disciplinary Neural Engineering (CDNE) Training Program | https://cne.psu.edu/cdne-training-program/

Program Description: The Penn State Center for Neural Engineering (CNE) has positioned itself at this boundary with faculty whose core expertise primarily falls in one realm – Materials and Devices; Theory and Computation; Brain Physiology; and Brain Human Health – and who recognize that with collaborations across the boundaries they can achieve together far more than they can on their own. The output of such work benefits not only from the deep knowledge and understanding each member brings to collaborations, but also from the effort put forward by each to communicate and understand the science and technologies brought by the other. Functionally, the CNE was founded to enable such collaborations among faculty who would value and leverage such interactions, and to bridge neuroscience and brain health research efforts between the University Park and Hershey campuses.

At the CNE, we invite bright and ambitious graduate students to join the Cross Disciplinary Neural Engineering (CDNE) training program funded by NIH. Through the program the 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, and thereby able to produce lasting advances in both basic neurosciences and human brain health.

For more information, email cdne@engr.psu.edu.

Application deadline: May 1, 2022. Students interested in coming to Penn State for graduate school with the aim of participating in the CDNE training program need to enroll through one of the CDNE participating departmental graduate programs.

GRE: The GRE is not required.

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. Ph.D. 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 ec12@princeton.edu.

Application deadline: November 22, 2021

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

GRE: The GRE is not required.

RUTGERS UNIVERSITY

Graduate Program in Neuroscience | https://grad.rutgers.edu/academics/graduate-programs/neuroscience

Program Description: The Rutgers Graduate Program in Neuroscience is a broad, interdisciplinary program that includes faculty members from several departments representing neuroscience, cell biology, molecular biology, biochemistry, psychology, psychiatry, genetics, neurology, and animal sciences. The Brain Health Institute coordinates neuroscience activities and seminars throughout the University. The Robert Wood Johnson Medical School Institute for Neurological Therapeutics has a dual mission in the discovery and development of novel treatments for neurological disorders and training graduate students and postdoctoral fellows in translating their laboratory discoveries to therapies. The program encompasses over 70 active faculty and there are multiple mechanisms for support of graduate students including several T32s, while over 50% of current students have individual extramural fellowship support. Areas of specialization represented by program labs include neurodegeneration; regulation of neural and glial gene expression; developmental neurobiology; autism; spinal cord and traumatic brain injury; stem cell biology; synaptic plasticity; and mechanisms of learning and memory and computational neurobiology. These cutting-edge research opportunities are supplemented by an equally broad range of activities that promote rigorous data analysis, extensive career exploration activities, as well as community outreach. Graduates from our program have thrived in post-graduate academic and industrial settings as well as other career options as they move to the next phase of their careers. Finally, Rutgers has a long history of diversity support mechanisms including a current Initiative for Maximizing Student Development (IMSD) program and additional dedicated funding mechanisms for diverse students.

For more information, email Joan Mordes, mordesja@rwjms.rutgers.edu.

Application deadline: December 1, 2021

Application fee waivers: Address inquiries to Joan Mordes, mordesja@rwjms.rutgers.edu.

GRE: The GRE is not required.

Information regarding COVID-19: Full time research and instruction have resumed at Rutgers.

STANFORD UNIVERSITY

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

Program Description: The Stanford Neurosciences Interdepartmental Program (IDP) offers interdisciplinary training leading to a Ph.D. 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.

Application deadline: November 30, 2021

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 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. For a complete list of fee waiver options and eligibility requirements, please visit https://graddiversity.stanford.edu/graduate-fee-waivers. Please note that fee waiver requests are required to be submitted 10 or 15 business days prior to the application deadline so please plan accordingly.

GRE: The GRE is not required.

Information regarding COVID-19: In light of the current situation with the COVID-19 pandemic, Stanford reaffirms its commitment to perform individualized, holistic review of each applicant to its graduate and professional programs. We recognize that students may have faced significant challenges during the period of disruption caused by the pandemic, and we will take such individual circumstances into account during application review. Importantly, we will respect decisions regarding the adoption of Credit/No Credit and other grading options during this unprecedented period of COVID-19 disruption, whether they are made by institutions or by individual students. Our goal remains to form graduate student cohorts that are excellent and encompass a diversity of perspectives, backgrounds, and experiences that enrich the graduate educational experience.

TEMPLE UNIVERSITY

Neuroscience Graduate Training Programs | http://www.temple.edu/neuroscience/

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 a neuroscience degree program that teaches students to explore neural and brain function at multiple levels in a rapidly growing field. These students study the neural basis of addiction, developmental disorders, ADHD, depression, anxiety, age-related disorders and much more. The Neuroscience Cluster at the Lewis Katz School of Medicine is an educational working group, supporting Ph.D., M.D./Ph.D., and M.S. 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, Center for Neurovirology and Comprehensive NeuroAIDS Center, 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, 2021 for the College of Liberal Arts Neuroscience Program; February 15, 2022 for the Lewis Katz School of Medicine Biomedical Sciences Program with Neurosciences Concentration

GRE: The GRE is not required.

UNIVERSITY OF CALIFORNIA BERKELEY

Neuroscience Ph.D. Program | http://neuroscience.berkeley.edu/

Program Description: The Berkeley Neuroscience Ph.D. Program offers intensive, integrated training in multiple areas of neuroscience research. The program includes 70 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 build new experimental, analytical, and theoretical approaches to probe brain function, development, aging, and disease. Our Neuroscience Ph.D. program provides a highly 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 65 students. Graduates of the Neuroscience Ph.D. Program have been extremely successful in both academia and industry. Since awarding our first Ph.D. in 2006, a total of 112 students have graduated from the program. Within this group, 31 alumni already have academic faculty positions, 29 hold postdoctoral research positions, and 27 have obtained positions in industry, including neuroscience, biotechnology, and Silicon Valley companies. We provide extensive professional training as part of the Ph.D. program. We strive to provide an inclusive and supportive training community for students with a wide variety of backgrounds.

For more information, email masilver@berkeley.edu.

Application deadline: December 1, 2021

Application fee waivers: BP-ENDURE program; ABRCMS; AISES; Ciencia Puerto Rico; Meyerhoff Program; PREP; RISE; MARC, and more.

GRE: The GRE is not required.

Information regarding COVID-19: We strongly hope to offer in-person or hybrid interview visits this year, if the public health situation permits.

UNIVERSITY OF CALIFORNIA DAVIS

Neuroscience Graduate Program | https://neuroscience.ucdavis.edu/

Program Description: The UC Davis Center for Neuroscience (CNS), home to the Neuroscience graduate program, is dedicated to understanding brain function in health and in illness. Our teams of internationally recognized scientists study areas ranging from cellular and molecular neurobiology, through systems and developmental neuroscience, to studies of human perception, attention, memory, language and the nature of consciousness. Their discoveries provide the raw material and building blocks that translate into advances in the clinic through close collaboration between bench scientists and physicians. In addition to discovery-driven research, CNS is home to three premier NIH T32 training programs for graduate and postdoctoral researchers. The Neuroscience Graduate Program provides students with unparalleled opportunities for research at the cutting edge of neuroscience, offering a comprehensive program of courses and outstanding research opportunities leading to the Ph.D. degree. The group is composed of over 80 faculty members drawn from 20 departments, divisions, and sections, including the School of Medicine, the School of Veterinary Medicine, the College of Biological Sciences, the College of Agriculture and Environmental Sciences and the College of Letters and Sciences.

For more information about the Training Program in Basic Neuroscience, visit https://grad.neuroscience.ucdavis.edu/Basic-Neuro. For more information about the Training Program in Learning, Memory and Plasticity (LaMP), visit https://lamp-training.ucdavis.edu/. For more information about the Training Program in Vision Sciences, visit https://vision-training.ucdavis.edu/.

Application deadline: December 1, 2021

Application fee waivers: Available to applicants affiliated with graduate prep programs (e.g., IMSD, MARC, RISE). For a full list, visit https://grad.ucdavis.edu/admissions/admission-requirements/steps-applying.

GRE: The GRE is not required.

Information regarding COVID-19: We strongly hope to offer in-person or hybrid interview visits this year, if the public health situation permits.

Post-ENDURE Annual Meeting Zoom Networking:

October 22, 2021, 2:00-3:00 p.m. P.T.
https://ucdavis.zoom.us/j/91564113471?pwd=aGt1anFzMjdIMk0wNHMrN0tkVm0zUT09
Meeting ID: 915 6411 3471
Passcode: 646606

UNIVERSITY OF CALIFORNIA LOS ANGELES

Training in Neurotechnology Translation | http://bri.ucla.edu/tnt/

Program Description: The rapid development and clinical translation of neurotechnology, such as brain stimulators and devices to map and monitor the brain, has revolutionized the care of neurologic and neuropsychiatric diseases. As the burden of these diseases on society increases at an exponential rate, society must be prepared and train future leaders who have multidisciplinary training and are prepared to develop, innovate, and translate basic neuroscientific findings into real-world neurotechnology solutions. The UCLA program, Training in Neurotechnology Translation (TNT), will serve as a training hub that will demand that trainees bridge the gap between technology and experimental science, taking advantage and building upon local expertise in relevant fields, close collaboration and interaction with industry partners, and the culture of innovation and translation that permeates UCLA.

For more information, email tnt@mednet.ucla.edu.

Application deadline: TBD. Program applications are open to currently enrolled Ph.D. students.

Application fee waivers: U.S. citizens and permanent residents may request a fee waiver in the Application Fee section of the application. Details on eligibility can be found here. Applicants should initiate this process as soon as possible to ensure a fee waiver can be processed prior to the application deadline. We also provide fee waivers to trainees in approved post-bac training programs.

GRE: The GRE is not required.

UNIVERSITY OF CALIFORNIA SAN FRANCISCO

Neuroscience Ph.D. Program | https://neurograd.ucsf.edu/about-neuroscience-graduate-program

Program Description: We utilize innovative cellular, computational, electrophysiological, genetic, imaging and molecular strategies to address outstanding problems in neuroscience. These approaches are employed in an integrative manner to engage in research in all areas of neuroscience, including behavior, biophysics, cell biology, development, neural systems, and disorders of the nervous system. Our curriculum and the system of laboratory rotations expose students to different fields in neuroscience, enabling them to make an informed choice about their thesis research. The high quality of the research and the collaborative nature of the UCSF environment offer a unique opportunity in which to take advantage of the interdisciplinary nature of research at the frontier of modern neuroscience.

UCSF is committed to a diverse and inclusive graduate student population, which enhances the educational experience, the workplace, and the nature of scientific research. The program participates in a number of initiatives along these lines (SRTP, UCLEADS, Diversity Network Initiative, IMSD, Diversity and Allyship breakfasts, Brain Camp @UCSF) some that are program specific and some that are through the UCSF Office of Diversity and Outreach.

The UCSF Neuroscience Graduate Program is committed to improving diversity, equity, and inclusion in our admissions process. We recognize that privilege and personal circumstance affect access to information and support when applying to graduate school. We aim to help reduce the impact of these inequities on the admissions process by highlighting the existence of organizations, not affiliated with UCSF, that support applicants who otherwise do not have adequate access to mentors or support networks, such as Project SHORT. Organizations such as Project SHORT often have limited capacity and enrollment deadlines. Thus, applicants should plan ahead to give themselves the best chance at receiving the support they need. Please note that the use of such third-party mentoring services does not guarantee any particular admissions outcome.

For more information, email pat.veitch@ucsf.edu. Follow on Twitter *@UCSFNSGrad*.

Application deadline: December 1, 2021

Application fee waivers: U.S. citizens and permanent residents may request a fee waiver in the Application Fee section of the application. Details on eligibility can be found here. Applicants should initiate this process as soon as possible to ensure a fee waiver can be processed prior to the application deadline. We also provide fee waivers to trainees in approved post-bac training programs.

GRE: The GRE is not required.

Information regarding COVID-19: We anticipate in person interviews in February 2022, but this is subject to COVID related restrictions which will be determined closer to that time.

Post-ENDURE Annual Meeting Zoom Networking Opportunity:

Nov 9, 2021, 12:00 - 2:00 p.m. P.T.

Register at https://www.eventbrite.com/e/2021-virtual-grad-student-fair-tickets-168658942437

UNIVERSITY OF CINCINNATI

Neuroscience Graduate Program | https://med2.uc.edu/neurosciences

Program Representative: James Herman, Ph.D.

Program Description: The Neuroscience Graduate Program at the University of Cincinnati encourages a focus on clinical translation and offers multiple areas of concentration. In addition to scholarship and laboratory training in high impact research within state-of-the-art facilities, the Program offers guidance and support for a wide range of professional careers.

For more information, email ucneurosci@ucmail.uc.edu.

Application deadline: December 7, 2021

Application fee waivers: Application fee waivers are available to McNair Scholars, State of Ohio STARS Scholars, and GEM Scholars. For more information, visit https://grad.uc.edu/admissions/faqs/process.html.

GRE: The GRE is not required.

Information regarding COVID-19: https://www.uc.edu/publichealth.html

UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

Neuroscience Graduate Program | http://medschool.ucdenver.edu/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 deanne.sylvester@cuanschutz.edu.

Application deadline: December 1, 2021

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 Deanne Sylvester, deanne.sylvester@cuanschutz.edu.

GRE: The GRE is not required.

UNIVERSITY OF IOWA

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

Program Description: The University of Iowa has a long tradition as a leading center for study of the nervous system and behavior, and for the training of graduate students in this area. The curriculum is designed to provide a multidisciplinary foundation in the conceptual and methodological approaches to study of the nervous system, emphasizing original, independent student research. The Neuroscience Program at the University of Iowa offers broad research opportunities with particular strength in areas including flexible curriculum, teaching experience, full financial support, and state-of-the-art facilities.

For more information, email grad-neuroscience@uiowa.edu.

Application deadline: December 1, 2021 for best consideration; January 1, 2022 for final deadline

Application fee waivers: Visit https://grad.admissions.uiowa.edu/finances/graduate-fee-waiver.

GRE: The GRE is not required.

Information regarding COVID-19: Visit https://coronavirus.uiowa.edu/.

UNIVERSITY OF MARYLAND SCHOOL OF MEDICINE

Program in Neuroscience | http://lifesciences.umaryland.edu/Neuroscience/

Program Description: The Graduate Program in Neuroscience trains outstanding graduate students to earn a Ph.D. 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 Georgia Rogers, grogers@som.umaryland.edu.

Application deadline: December 1, 2021

Application fee waivers: Please contact grogers@som.umaryland.edu for fee waiver information.

GRE: The GRE is not required.

UNIVERSITY OF MICHIGAN

Biomedical Engineering | https://bme.umich.edu/

Program Description: The Biomedical Engineering department at the University of Michigan offers graduate M.S. and Ph.D. degrees. U-M has one of the largest BME graduate programs in the U.S. and has awarded more advanced degrees than any other BME department in the country. We have six graduate concentrations, including neural engineering, in which students take advanced coursework to further their education. Matriculated Ph.D. students have five years guaranteed funding, supported by their research advisors, through fellowships, or as graduate student instructors. U-M is one of the few universities in the country with top-ranked engineering and medical schools on the same campus. Our diverse research strengths include neural engineering, biomechanics, computation and modeling, imaging, regenerative medicine, nanotechnology, and other areas. U-M has a long history of excellence in Neuroscience and Neural Engineering research. The Michigan Probe for intracortical interfacing with the brain was developed here. BME faculty have preclinical and clinical research thrusts in neuromodulation for pain, bladder dysfunction, and gastric and movement disorders, prosthetic control for amputees, and retinal prosthesis development, and core and affiliate faculty have many other research focuses, including brain-computer interfaces, epilepsy monitoring, computational modeling, and deep brain stimulation. U-M is also a home for entrepreneurs, and with the renowned Ross School of Business, the Center for Entrepreneurship, the Coulter Translational Research Partnership, and student-led groups like Sling Health and M-HEAL, there are many opportunities for graduate students of all levels to expand their experience in medical innovation and entrepreneurship. Finally, U-M's home of Ann Arbor is consistently ranked as one of the top places to live. Ann Arbor is a safe, vibrant, progressive college town with parks, restaurants, museums, sports, and a commitment to the arts. Check us out!

For more information, email Tim Bruns, bruns@umich.edu.

Application deadline: December 1, 2021

Application fee waivers: Numerous waivers are available. For more information, see our Graduate School. https://rackham.umich.edu/admissions/applying/application-fee-and-waivers/.

GRE: The GRE is not required.

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 Ph.D. 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 Ph.D. 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, 2021

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/applicationfee-and-waivers/. Please contact neuroscience.program@umich.edu about additional opportunities for fee waivers.

GRE: The GRE is not required.

Information regarding COVID-19: The University of Michigan currently requires COVID-19 vaccination of all University of Michigan students, faculty, and staff unless you have an approved exemption. There is not currently a policy for extensions to the application deadline due to COVID-19. We encourage any applicant who is running into a delay due to COVID to be in contact with us at neuroscience.program@umich.edu.

Post-ENDURE Annual Meeting Virtual Networking:

> **Oct 20, 2021, 5:00 -6:00 p.m. E.T.**
> https://umich.zoom.us/j/97601402381
> Meeting ID: 976 0140 2381
> Passcode: 272462
> *Additional Zoom Networking Events for Prospective Students will be posted @NGPMichigan.*

UNIVERSITY OF MINNESOTA

Neuroscience Graduate Program | http://www.neuroscience.umn.edu

Program Description: The Graduate Program in Neuroscience (GPN) is an interdepartmental Ph.D. program offering comprehensive training in neuroscience research in a world class city. The goal of the GPN is to foster independent and creative thinking about important questions in neuroscience, to provide students with training that will prepare them for a variety of career paths, and support and encourage interest in brain research in the broader community.

For more information, email neurosci@umn.edu.

Application deadline: December 1, 2021

Application fee waivers: Contact neurosci@umn.edu.

GRE: The GRE is not required.

Information regarding COVID-19: The University of Minnesota has returned to a full on-campus instruction and research presence and requires vaccinations.

UNIVERSITY OF PITTSBURGH

Center for Neuroscience | https://www.cnup.pitt.edu/about

Program Description: The CNUP Graduate Training Program is designed to accomplish several objectives:

- To develop competence in conducting laboratory research including planning, executing, reporting, and defending an original piece of research relevant to the study of neuroscience.
- To develop general competence in neuroscience and specific expertise in one or more areas of neuroscience such as behavioral/systems/cognitive, cell and molecular, development/plasticity/repair, and neurobiology of disease.
- To develop a general professional competence in oral and written expression, necessary for a career in science and/or teaching.
- To develop fundamental skills in scientific reasoning required to redefine research questions and devise innovative multidisciplinary strategies as a means for adapting to the continually evolving landscape of neuroscience and neuroscience research.

In formulating the graduate training program, the faculty has been guided by several principles. First, the program aids each student in the development of an individualized training program based on the student's background and interests. Second, research experience forms the core of each student's training. Thus, students are expected to begin research immediately upon entering the program. Third, students are typically able to complete the program in approximately five years. Fourth, the progress that a student makes in the program is considered primarily in terms of the student's performance as an investigator: designing, conducting, and evaluating research, both their own and that of others.

For more information, email Rob Turner, rturner@pitt.edu.

Application deadline: December 1, 2021

Application fee waivers: The application fee may be waived for applicants who: have participated in a national fellowship, program, or event; are international applicants applying through an outside fellowship organization; have earned or are in the process of earning an undergraduate or graduate degree from a Minority Serving Institution (MSI); are honorably discharged veterans and active duty members of the U.S. Armed Services; are current University staff; are experiencing financial hardship.

GRE: The GRE is not required.

Information regarding COVID-19: Our visits and interviews will be virtual rather than in-person. Other than that, the admissions process is the same as previous years. Currently, many of the graduate classes are currently being offered virtually and most research activities are occurring in-person with social distancing and mask-wearing. The CNUP graduate program is doing everything possible to be flexible and supportive during this time.

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!

For more information, email David Morilak, morilak@uthscsa.edu.

Application deadline: Priority deadline for applications is Jan 1 – later applications will be accepted but availability of potential interview dates may be limited.

Application fee waivers: NO APPLICATION FEE.

GRE: The GRE is not required.

Information regarding COVID-19: We follow all recommended safety and mitigation protocols. Vaccination is available on campus for students, universal masking and social distancing practices are in place

UNIVERSITY OF UTAH

Neuroscience Ph.D. Program | http://neuroscience.med.utah.edu/

Program Description: The primary goal of the Neuroscience Program at the University of Utah is to develop well-rounded scientists who will become the next generation of leaders in our society. Our program offers rigorous training through a combination of coursework, research training, mentoring, and professional development. More than 80 program faculty from 26 participating basic and clinical departments provide broad expertise from molecular and cellular neuroscience, to systems and cognitive neuroscience. Students receive hands-on training and mentorship within a world-class research environment, collegial and collaborative mentorship and a vibrant research community. Our mentors provide guidance across a range of research and career options. 98% of our graduates have obtained careers in science related positions in academic or industry. Incoming students begin formal training through a series of wet lab bootcamps in molecular neurobiology and electrophysiology, and through a series of three 8-week rotations within specific Neuroscience Program labs. Students also receive formal training through core and elective course work in order to ensure each student has a practical foundation in neurodevelopment, cell and molecular neurobiology, systems neuroscience, anatomy and statistics. Through electives students are able to hone their knowledge across disciplines such as computational neuroscience, genomics, advanced molecular biology, electrophysiology, and pharmacology. In addition to coursework, student's knowledge is further established through 1st year capstone exam, 2nd year qualifying exam and final year thesis defense. Students also have the unique opportunity to develop professionally through a variety of student leadership roles, such as organizing the Annual Snowbird Neuroscience Symposium and Neuroscience Program Speaker Series. Our Neuroscience Program is committed to promoting diversity and inclusion within our program and our broader community. Our faculty and students lead and participate in programs including the University of Utah - Rising Stars in Neuroscience Symposium, Women in Neuroscience, ABRCMs and SACNAS meetings and Brain Awareness Week.

For more information, email jim.heys@neuro.utah.edu.

Application deadline: December 31, 2021

Application fee waivers: NO APPLICATION FEE.

GRE: The GRE is not required.

Post-ENDURE Annual Meeting Zoom Networking:

Virtual Open House
November 9, 2021 at 10 a.m. M.T./12 p.m. E.T.
https://forms.gle/y7QXPSGLmoHUCfW97

UNIVERSITY OF VIRGINIA

Brain Immunology and Glia Training Program | https://med.virginia.edu/big/

Program Description: The Brain Immunology ang Glia Training Program (BIGTP) at the University of Virginia (UVA) builds on existing strengths in neuroimmunology and glia research and the programming that has been in place since the establishment of the center from Brain Immunology and Glia (BIG) in 2012. The BIGTP brings together 20 mentors from eight different departments with the goal of providing interdisciplinary training that sparks discoveries and prepares a generation of researchers that are uniquely equipped to tackle research questions that arise at the interface of neuroscience and immunology. Two predoctoral trainees are supported each year for a duration of two years, typically in years three and four of graduate training. Trainees will partake in the dynamic BIG research in progress seminars that are held weekly. Trainees will also have access to leaders in the field through the BIG Neuro seminar series. Annual retreats focus on trainee development, review of the program, and allow trainees to interact with members of the BIGTP External Advisory Board that are invited as keynote speakers. The quantitative literacy of trainees is developed and supported through the Quantitative Literacy Series designed specifically for trainees that addresses topics in experimental design, reproducibility, power analysis, statistical analyses, transparency in reporting, etc. The BIGTP leadership and mentors understand the importance of diversity, which is essential for the strength and growth of the BIGTP. The NIH-sponsored T32 training program provides unparalleled training for predoctoral trainees in a burgeoning research area. Those interested in the BIGTP should apply to the umbrella Biomedical Sciences (BIMS) Graduate Program at UVA and indicate interests in neuroimmunology and/or neuroscience.

For more information, email tajieharris@virginia.edu.

Application deadline: November 30, 2021

Application fee waivers: Available upon request at https://graddiversity.virginia.edu/application-fee-waiver.

GRE: The GRE is not required.

UNIVERSITY OF WASHINGTON

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

Program Description: The goal of the Graduate Program in Neuroscience is to produce the best neuroscientists possible. The breadth of our faculty allows us to provide interdisciplinary training drawing from a variety of topics, techniques, and perspectives, including neuroanatomy, biochemistry, molecular biology, physiology, biophysics, pharmacology, in vivo brain imaging (e.g., fMRI, M-EEG), computational modeling and behavior. A graduate of our program will be well versed in the neurosciences, prepared to conduct independent research, and equipped to pursue a variety of career paths. 170+ faculty members of the University of Washington provide outstanding graduate training in all areas of modern neuroscience. Our students perform cutting-edge research, at a leading research university, in one of the most famously livable American cities.

For more information, email neurogrd@uw.edu.

Application deadline: November 29, 2021 by 5 p.m. PT

Application fee waivers: Fee waivers available for McNair Scholars and for financial needs. Make sure to submit application one week early to ensure fee waiver has enough time to clear.

GRE: The GRE is not required.

Information regarding COVID-19: Interviews will be online with potential accepted student days to follow.

VANDERBILT UNIVERSITY

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

Program Description: Vanderbilt's Neuroscience Graduate Program prepares each student to make significant contributions in neuroscience and fosters development from trainee to independent research scientist and educator. This is achieved by combining sound training in the fundamentals of neural science with more specialized training that focuses on the integration of this knowledge base into a study of nervous system function and disease. Students have the option of a curriculum and research program that emphasizes either cellular & molecular or cognitive & systems neuroscience. The training, which combines rigorous course work with opportunities for state-of-the-art research, is designed to prepare graduates for a future in which neuroscientists must be able to make the transition from molecules and cells to neural systems and behavior.

For more information, contact roz.johnson@vanderbilt.edu.

Application deadline: December 1, 2021

Application fee waivers: Visit https://gradschool.vanderbilt.edu/admissions/application/index.php.

GRE: The GRE is required.

Information regarding COVID-19: For the University's COVID-19 policy, visit https://www.vanderbilt.edu/coronavirus/.

WAKE FOREST SCHOOL OF MEDICINE

Neuroscience Program | http://neuroscience.graduate.wfu.edu/

Program Description: Neuroscience Ph.D. training has been a component of graduate student training at Wake Forest University for approximately 28 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 e.g., with a Clinical, Population and Translational Science (CPTS) certificate or M.S. in Health Disparities in Neuroscience Disorders (HDND) and collaborations with industry e.g. Ph.D./M.B.A. program, commercialization and tech transfer elective courses, or industry internships.

For more information, email milligan@wakehealth.edu.

Application deadline: December 6, 2021

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.

GRE: The GRE is not required.

WASHINGTON UNIVERSITY IN ST. LOUIS

Program in Neuroscience | http://neuroscience.wustl.edu/

Program Description: We aim to train scientists in the workings of the nervous system and equip them to pursue fundamental questions with clear thinking and powerful tools. Our program sustains and grows a pioneering scientific spirit paired with enthusiastic collaboration, genuine affection, and a passion to see each trainee flourish.

To meet these expectations, we:

1. provide many opportunities for students to deepen their knowledge of specific areas of neuroscience
2. recruit, train, and support students from diverse scientific, ethnic, racial, gender, and socio-economic backgrounds
3. demonstrate and teach high standards of ethics and professional conduct
4. ensure fluency in best practices for rigor & reproducibility, quantitative & statistical thinking, and written and verbal communication
5. promote and support collaboration and interaction across the neuroscience community at Washington University
6. advise students throughout their Ph.D. careers on academic and non-academic issues
7. respond quickly and transparently to student concerns, questions, and program issues
8. provide career exploration and preparation towards diverse career goals

For more information, email vogts@wustl.edu.

Application deadline: December 1, 2021

Application fee waivers: Fee waivers are available for: Washington University undergraduates; participants in Washington University summer bioscience research programs; students mentored by a DBBS alum; and applicants with financial need. Fee waivers are also granted to applicants from the following programs: MARC, McNair, RISE, IMSD, INRO, LSAMP, BP-ENDURE, PREP, BUILD, PPIA, DACA students, IRT-Institute for the Recruitment of Teachers, Target Hope, Fulbright Scholars, AmeriCorps, Vista/Peace Corps, Teach for America, Gates Millennium Scholars, Mellon Mays Graduate Initiative, Ron Brown Scholars, and Vietnam Education Foundation.

If you think you qualify for a fee waiver, please email DBBSPhDAdmissions@email.wustl.edu.

GRE: The GRE is not required.

Information regarding COVID-19: Limitations on applicant's access to research experiences or other activities due to the pandemic will be taken into account.

WASHINGTON UNIVERSITY IN ST. LOUIS

Cognitive, Computational, and Systems Neuroscience | https://sites.wustl.edu/systemsneuroscience/ccsn-pathway/

Program Description: CCSN is a specialized curriculum available to students pursuing a Ph.D. in Neuroscience, Psychological and Brain Sciences, Biomedical Engineering, or other brain-related disciplines at Washington University (including students in the Medical Scientist Training Program). The CCSN Pathway is not a separate degree-granting program, and CCSN students must fulfill all of the degree requirements of their home programs. The CCSN Pathway provides an integrated curriculum that is compatible with course-scheduling constraints in the home degree-granting programs. The curriculum is challenging and is designed to help students tackle problems using an interdisciplinary approach.

The CCSN Pathway develops in two phases. In Phase 1 (years 1-2), students take 3 pre-requisite courses (at least one of which fulfills a requirement in the home Ph.D. program). Through these courses, students obtain the requisite background and foundation in each of the three components of the pathway (Behavior/Cognition, Systems Neuroscience, Neural Computation). In Phase 2 (years 3-4), CCSN students receive extended trans-disciplinary training, through two custom-designed courses that develop their quantitative fluency and knowledge of cutting-edge data science approaches, which culminates in the development of a trans-disciplinary research project. In addition, they enhance their scientific skills through a series of career development activities, including mentoring junior CCSN students, organizing and participating in immersive encounters with external speakers, presenting at a CCSN seminar series, and taking part in informal dinners with CCSN faculty. Through these activities, CCSN students acquire leadership skills, build relationships within the community, and network with experts in the field.

Throughout the Pathway, CCSN students participate to community outreach activities promoted by the St. Louis Neuroscience Outreach Program. CCSN is supported by a T32 from the NINDS, by the McDonnel Center for Systems Neuroscience, and by the Provost.

For more information, email Carmen Horn, horn_c@wustl.edu.

Application deadline: There is no formal application.

Application fee waivers: N/A

GRE: N/A

YALE UNIVERSITY

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

Program Description: The interdisciplinary research activities of Yale neuroscience faculty are central to Yale's Graduate Neuroscience Program. This unique, broad-based training program is best described as a "department without walls," whose primary purpose is providing students with maximum diversity and depth in the most important areas of neuroscience research. The training program draws on the knowledge and expertise of 130+ faculty members, representing at least 20 departments, ranging from Neuroscience, Psychiatry and Pharmacology to Computer Science. Faculty work together as a cohesive and collaborative unit whose aim is to foster in graduate students an appreciation of and familiarity with the breadth of neuroscience and to create an environment in which students are encouraged to study problems from several perspectives. The Neuroscience Track students graduate with both specialized knowledge and a broad understanding of the discipline. Students engage with a recently revised core curriculum, designed to ensure a comprehensive understanding of modern neuroscience. Students complete at least two laboratory rotations in different areas of neuroscience. A course in Statistics and Data Analysis is required as well as two additional electives. Admission to candidacy requires passing a qualifying examination and a dissertation prospectus (NIH NRSA grant format). These requirements, in addition to journal clubs, Student Research Talks, a seminar series and an annual one-day research retreat expose students to the multi-disciplinary nature of the field in a highly interactive environment.

Successful candidates come from undergraduate institutions such as Cornell, University of Wisconsin, Johns Hopkins, NYU, University of Oregon, Kenyon College, Rutgers, UCSD, Howard, UMBC and many more. They have range and depth of research experience and strong academic preparation. Clear communication and demonstrated leadership ability are valued skills. Average time to degree is 5.4 years and our

graduates go on to careers in academia, industry (consulting, biotech and pharma), and other related fields.

For more information, email carol.russo@yale.edu.

Application deadline: December 1, 2021

Application fee waivers: For detailed information, visit https://gsas.yale.edu/admissions/phdmasters-application-process/application-fees-fee-waivers.

Information regarding COVID-19: Our recruitment activities this year will be a hybrid model. Interviews in January will be conducted virtually. We will have an in-person recruitment weekend for candidates offered admission in February when admittees will meet with their faculty of interest and get to know our graduate students in small groups.

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NETWORKING EXERCISES

During the ENDURE meeting, you'll have some time in breakout rooms to develop your networking skills with your peers. Prior to Oct. 19th, complete the pre-meeting exercises for "Exercise 1: Presenting Yourself and Your Science" and "Exercise 2: Developing Your Network":

- ☐ Exercise #1: Draft and practice your elevator pitch
- ☐ Exercise #2: Reflect on your networking experience by filling out the table below

Exercise #1: Presenting Yourself and Your Science

Each trainee will share "elevator pitches" in small ENDURE break-out groups.

- ☐ Exercise #1: Draft and practice your elevator pitch
  - ✓ Practice saying it aloud: in front of a mirror and then in front of friends
  - ✓ Be open to feedback at the meeting

How to Develop an Elevator Pitch

Elevator pitches briefly communicate who you are, what you do, and why your listener should care (60 seconds or less). They should be tailored to your listener and to your reasons for speaking to that person. If your listener is not familiar with your field of research, try to avoid too much jargon!

They have three main parts (*no more than 2 sentences for each part*):

1. Introduction
   - Your name, position, and institution
   - Elaborate on any of these facts, if relevant
2. **Research Interests** - A *very* basic summary of your research interests/accomplishments/goals (this can be your current research or research you'd like to conduct in the future)
   - What is the problem that you are seeking to solve?
   - Potential areas to elaborate: What are potential solutions or interesting questions raised by your research? How might it benefit human health and/or the community? Why are you excited about this research?
   - What are your research goals?
3. **"So What?"** - The take-home message/action item
   - What would you like your audience to remember after your conversation?
     - Do you have an exciting finding?
     - Are you looking for a graduate school program?
     - Are you looking for a collaborator or to learn a new technique?
     - Do you want to schedule a follow-up conversation to discuss your career path?

Remember: Tell your story, not your data!

Elevator Pitch Video Examples

- Jaybree Lopez: https://www.youtube.com/watch?v=bAVc5AqZUso
- Elly Martin: https://www.youtube.com/watch?v=cMaHs2kFFds
- Michael McGuire: https://www.youtube.com/watch?v=NBa0cnsRMUQ
- Abigail Cawley: https://www.youtube.com/watch?v=BRqkxz2OCd0

Exercise #2: Developing Your Network

In small groups, we will discuss some of your strategies for networking and give an example of when networking led to positive personal or professional outcomes.

What is Networking?

- Establishing and maintaining relationships between multiple individuals to the mutual benefit of all parties involved
- Meeting new people, nurturing current relationships and figuring out how each person can benefit from knowing the other

Create Your Networking Plan

- Identify the people who you will need to meet, people with critical knowledge, information, and contacts
- If possible, do your background research on specific universities, labs, companies, positions, openings – google websites, talk to peers
- Design talking points to obtain the critical information that you will need
- Create your elevator speech! Who are you?; Where do you work?; What you do? What are you researching? (see above)
- Have open ended questions and a few talking points ready
- After the conversation, for relationships you wish to maintain:
    - Organize contacts
    - Email a personal follow-up notes, thanking individuals for the communication
    - Foster relationships by performing the following:
        - Follow school/program on LinkedIn/Twitter
        - Periodic check-ins
        - Remember that these relationships are bidirectional

□ Exercise #2: Reflect on your networking experience by filling out the table below

- ✓ Develop an inventory of circumstances in which you have had success/thrived.
- ✓ Describe situations that support your strengths and position you for networking wins/successes. This is a painless, self-affirming process.

Steps for filling out the networking table on the next page:

1. Recall past experiences that you enjoyed and events in which you were at your peak. Examples can be professional or personal; a range is good. Make an unfiltered list—it needn't satisfy the left side of your brain's urge to be logical or seem relevant. Take a moment, close your eyes, and take a few deep breaths to be receptive, allowing these positive memories to surface. Write up to three that came to mind in the first column of the table below.
2. Review the situations you listed. In the second column, assess what specifically about these situations caused you to feel comfortable and thrive. Examples include having a defined role, doing an enjoyable activity, intellectual stimulation, physical challenge, novel experience, inherent reward, or learning something new.
3. In the third column, brainstorm an unfiltered list of potential new situations that meet the criteria identified in column two.

	Previous Situation	What Made it Work	Opportunity for Success
1			
2			
3			

(Credit: Networking for People Who Hate Networking: A Field Guide for Introverts, the Overwhelmed, and the Underconnected by Devora Zack)

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

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/

SCIENTIFIC 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://www.minorityhealth.org/

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

Científico Latino
https://www.cientificolatino.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

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

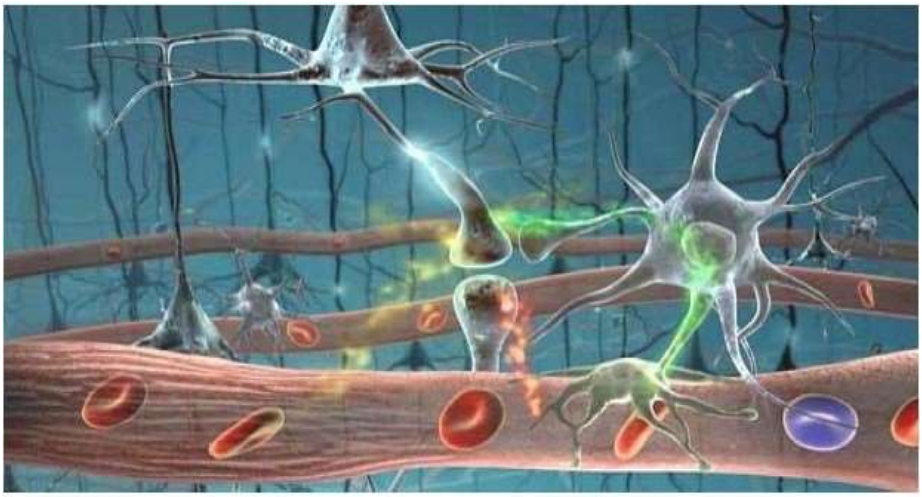
ENDURE PRIDE

ENDURE has been changing the face of neuroscience research and impacting the scientific community for eleven (11) years! Stay connected to the ENDURE network and as scientists use the evidence below to replicate your own success! Visit and like the ENDURE Facebook page, www.facebook.com/BP.ENDURE, to (1) build/maintain a support system, (2) facilitate future transition and research collaboration, and (3) provide awareness of neuroscience resources within and outside of NIH. We've also started a group for you to build your professional network on LinkedIn: An ENDUREing Network.

We wish the best to current scholars completing their undergraduate education during a global pandemic – keep up the great work! We also offer congratulations to alumni who have completed their tenure with ENDURE and are continuing their education, training, and career development journeys!

Ph.D. Graduate Programs of ENDURE Alumni

Albert Einstein College of Medicine
Boston University
Brown University
City University of New York
Columbia University
Cornell University
Emory University
Georgetown University
Harvard University
Icahn School of Medicine at Mt. Sinai
Institute of Science and Technology Austria
Johns Hopkins University
Massachusetts Institute of Technology
Michigan State University
New Mexico State University
New York University
The Ohio State University
Oregon Health & Science University
Ponce Health Sciences University
Princeton University
Rosalind Franklin University of Medicine and Science
Stanford University
University of Alabama
University of Alabama at Birmingham
University of Arizona
University of California, Berkeley
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 Boulder
University of Colorado Anschutz Medical Campus
University of Georgia
University of Houston
University of Illinois at Chicago
University of Iowa
University of Massachusetts Amherst
University of Michigan
University of North Carolina at Chapel Hill
University of Pennsylvania
University of Pittsburgh
University of Puerto Rico
University of Southern California
University Texas at Austin
The University of Texas at San Antonio
University of Texas Southwestern Medical Center
University of Texas Health Science Center at San Antonio
University of Washington
University of Wisconsin-Madison
University of Utah
Washington State University
Washington University in St. Louis



THANK YOU FOR YOUR PARTICIPATION!!

Stay safe and take care!