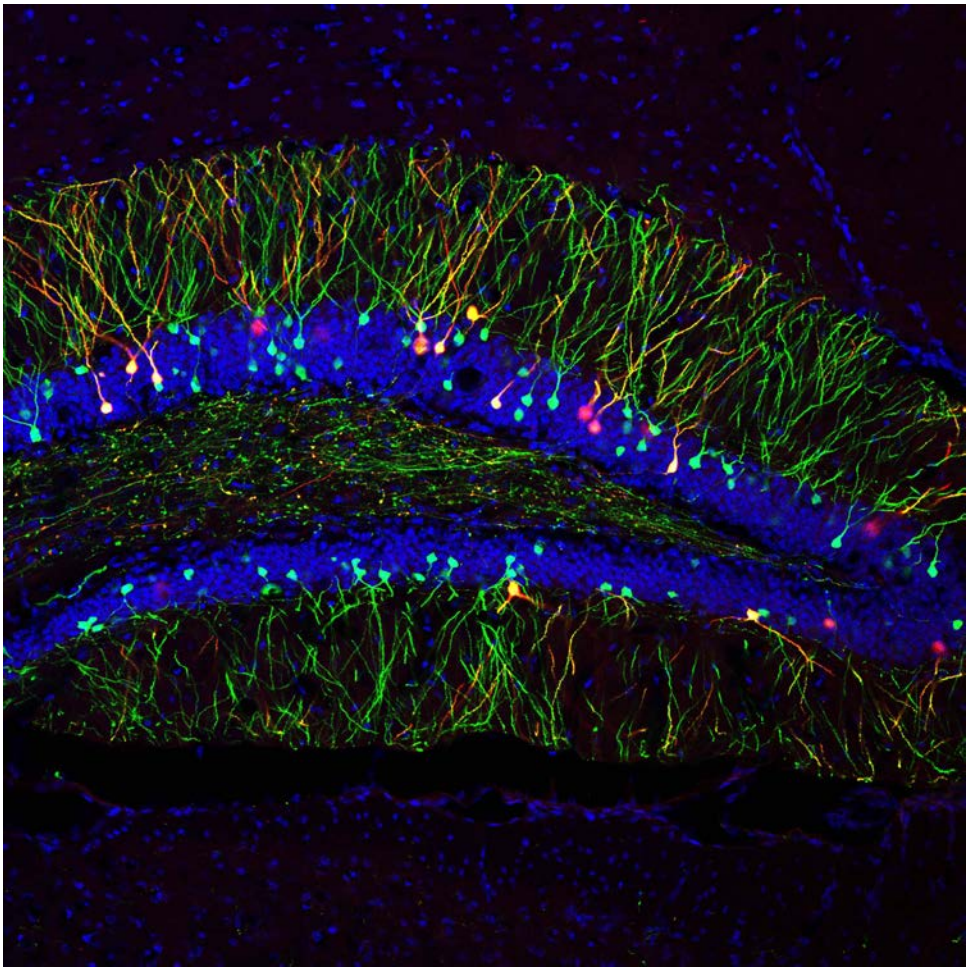
UTHSC NEUROSCIENCE INSTITUTE

THEC Neuroscience Center of Excellence

Annual Report to the

Tennessee Higher Education Commission (THEC)

Fiscal Year 2023 (7/1/2022-6/30/2023)



I. MISSION STATEMENT

The Neuroscience Institute (NI) at the University of Tennessee Health Science Center (UTHSC) is supported by the Neuroscience Center of Excellence, one of several Centers of Excellence established by the Tennessee Higher Education Commission in 1985. Our mission is to develop and support multidisciplinary research and training in neuroscience. We feature basic science and clinical members spanning 13 departments and three colleges, and foster neuroscience research through support of neuroscience track graduate students and postdocs, the NI Imaging Center and Behavioral Core, a robust seminar series, and start-up packages for new faculty. The brain is the final frontier of biology. Scientific inquiry has produced remarkably detailed knowledge of the physical world and much of the life sciences, including details of the human genome. However, our knowledge of the brain is far from complete. The nature and mechanisms of consciousness, thought, perception, learning, memory and many diseases of the nervous system are poorly understood. Neuroscience is now at an exciting threshold of discovery and unprecedented growth. The resulting explosion of information is rapidly increasing our understanding of the basic mechanisms of brain structure and function. This emerging knowledge is helping us discover effective treatments and even cures for some neurological diseases. More information concerning the NI is available at: https://www.uthsc.edu/neuroscience-institute/

II. EXECUTIVE SUMMARY

In FY 2023 the NI/Center of Excellence continued the start-up fund support of (1) Dr. Tauheed Ishrat, an R01-funded associate professor and stroke/Alzheimer's neurobiologist recruited into the Anatomy & Neurobiology Department in 2017; (2) Dr. Il Hwan Kim, an R01-funded assistant professor and social behavior neurobiologist recruited from Duke University into the Anatomy and Neurobiology Department in 2019; and (3) Dr. Jianyang Du, an R01-funded associate professor and social behavior neurobiologist in the Anatomy & Neurobiology Department in January 2020. We provided stipend support to 4 graduate students and had 16 students in the Neuroscience Track of the Biomedical Sciences Ph.D. program, after accepting 3 new students. We supported 2 postdocs in the Departments of Ophthalmology and Pharmaceutical Sciences. We further promoted neuroscience research by: (1) providing the Neuroscience Seminar series, mixing outside speakers with UTHSC and affiliated faculty; and (2) continuing the undergraduate summer Neuroscience Merit Fellowship program supported two students from Rhodes College. We supported the NI Imaging Center, a cost-recovery facility providing the only transmission electron microscope (JEOL 2000) on campus, a Zeiss 800 Aryscan laser-line confocal microscope and a Neurolucida 3-dimensional reconstruction workstation, and the Neuroscience Behavioral Core. We purchased a Leica Cryostat and a new computer workstation for the JEOL electron microscope. We supplemented the service contracts of these instruments and software to keep user fees low. We supported the Imaging Center's Technical Director, Esther Marquez Wilkins, Ph.D. Matthew Ennis, Ph.D., Chair of the Department of Anatomy & Neurobiology, continued as Interim Director since August 2020. The College of Medicine has recruited Lynn Dobrunz, Ph.D., a prominent neuroscientist from the University of Alabama/Birmingham, to be the new Chair of the Department of Anatomy & Neurobiology and the new Neuroscience Institute Director. She will begin these positions October 1, 2023.

III. TABLE OF CONTENTS

IV. ADMINISTRATIVE STRUCTURE

Interim Director: Matthew Ennis, Ph.D., Department of Anatomy & Neurobiology

Co-Director: John Boughter, Ph.D., Department of Anatomy & Neurobiology

Administrative Specialist: Mistie Brewer

Program Coordinator/IT Specialist: Brandy Fleming, M.S.

Center Address: University of Tennessee Health Science Center
875 Monroe Ave., Suite 426, Wittenborg Building, Memphis TN 38163
(901) 448-5960 https://www.uthsc.edu/neuroscience-institute/

Neuroscience Executive Committee:

John Boughter, Ph.D., Professor and NI Co-Director, Department of Anatomy and Neurobiology

Matthew Ennis, Ph.D., Professor and Chair, Department of Anatomy and Neurobiology

TJ Hollingsworth, Ph.D., Assistant Professor, Department of Ophthalmology

Jon Jaggar, Ph.D., Professor, Department of Physiology

Shalini Narayana, Ph.D., Associate Professor, Pediatric Neurology, Le Bonheur Hospital/UTHSC

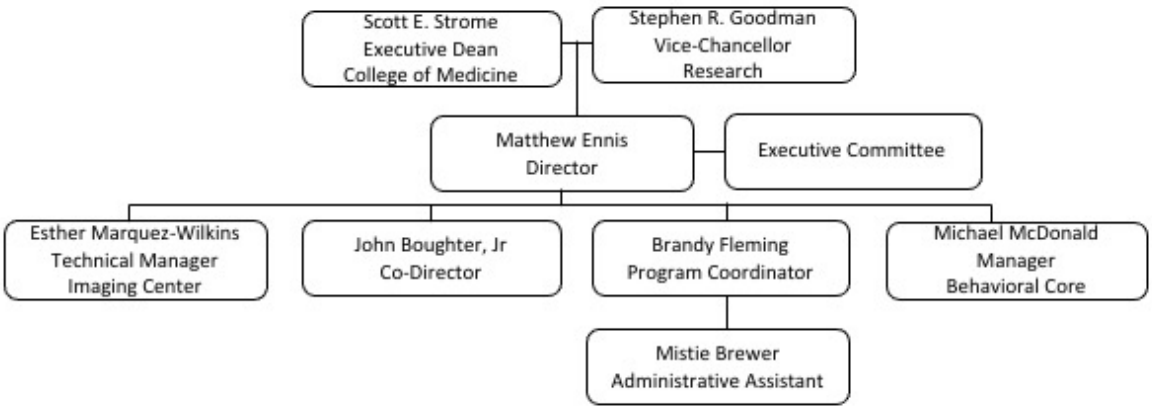
Jeff Steketee, Ph.D., Professor, Department of Pharmacology

Steven Tavalin Ph.D., Associate Professor, Department of Pharmacology

Jim Wheless, M.D., Professor, Chief of Pediatric Neurology and LeBonheur Chair, Le Bonheur Hospital/UTHSC

The executive meets at least twice a year to (1) review the budget and make budget recommendations, (2) vote on faculty who wish to become NI members or addition of new Executive Committee members, (3) reviews and determines awardees for the NI Postdoctoral Support and Pilot Project programs.

NI Organizational Chart



V. FACULTY OF THE NEUROSCIENCE INSTITUTE

In FY2023, the Neuroscience Institute wass comprised of 68 faculty members in 13 different departments on the UTHSC campus, including those with primary appointments at St. Jude Children's Research Hospital and one faculty member at UT Knoxville. Faculty are listed by department; those with primary appointments outside UTHSC or UTK are so indicated. We added one new member (*), and 3 members left UTHSC as indicated, this past FY.

Department of Anatomy and Neurobiology

William E. Armstrong, Ph.D., Professor Emeritus
Alessandra d'Azzo, Ph.D., Affiliated Professor (St. Jude)
Jay Bickoff, Ph.D., Affiliated Assistant Professor (St. Jude)
John D. Boughter, Jr., Ph.D. Professor and NI Co-Director
Joseph C. Callaway, Ph.D., Associate Professor
Viktor Chizhikov, Ph.D., Associate Professorr
Jianyang Du, Ph.D., Associate Professorr
Michael A. Dyer, Ph.D., Affiliated Professor (St. Jude)
Matthew Ennis, Ph.D., Simon R. Breusch Professor and Chair; Interim NI Director
Max Fletcher, Ph.D., Associate Professor
Robert C. Foehring, Ph.D., Professor Emeritus
Kristin Hamre, Ph.D., Associate Professor
Detlef Heck, Ph.D., Professor (departed UTHSC 4/2023)
Marcia G. Honig, Ph.D., Professor Emeritus
Tauheed Ishrat, Ph.D., Associate Professor
Il Hwan Kim, Ph.D., Assistant Professor
Hitoshi Kita, Ph.D., Professor Emeritus
Peter J. McKinnon, Ph.D., Affiliated Professor (St. Jude)
James I. Morgan, Ph.D., Affiliated Professor (St. Jude)
Anton J. Reiner, Ph.D., Professor Emeritus
Lindsay Schwarz, Ph.D., Affiliated Assistant Professor (St. Jude)
J. Paul Taylor, M.D., Ph.D., Affiliated Professor (St. Jude)
Robert S. Waters, Ph.D., Professor
Stanislav Zahkarenko, Ph.D. Affiliated Professor (St. Jude)

Department of Biochemistry and Cellular and Molecular Biology, UT Knoxville

Rebecca A. Prosser, Ph.D., Professor

Department of Genetics, Genomics and Informatics

Robert W. Williams, Ph.D., UT-Oak Ridge National Laboratory Governor's Chair in Computational Genomics, Professor and Chair; Director, Center for Integrative and Translational Genomics

Byron Jones, Ph.D., Professor

Lu Lu, Ph.D., Professor

Megan Mulligan, Ph.D., Assistant Professor

Burt Sharp, M.D., Van Fleet Professor

Department of Medicine/Cardiology

Syamal Bhattacharya, Ph.D., Professor

Department of Psychiatry

Ronald Cowan, M.D., Ph.D., Professor and Chair

Department of Neurology

Michael McDonald, Ph.D., Professor

Mohammad Khan, Ph.D., Assistant Professor

Thaddeus S. Nowak, Ph.D., Professor

Lawrence T. Reiter, Ph.D., Professor

Department of Neurosurgery

Frederick Boop, M.D., Professor and Chair

Department of Ophthalmology

Rajashekhar Gangaraju, Ph.D., Assistant Professor

TJ Hollingsworth, Ph.D., Assistant Professor

Monica M. Jablonski, Ph.D., Professor

Nawajes Mandal, Ph.D., Professor

Siamak Yousefi. Ph.D., Assistant Professor

Department of Pediatrics, Pediatric Neurology and LeBonheur Children’s Hospital

Shalini Narayana, Ph.D., Associate Professor, Pediatric Neurology, Le Bonheur

Massroor Pourcyrous, M.D., Professor, Pediatrics

James W. Wheless, M.D., Professor and Chief of Pediatric Neurology, Le Bonheur

Department of Pharmaceutical Sciences

Duane D. Miller, Ph.D., Van Fleet Professor and Chair

Bob Moore, Ph.D., Professor

Jianxiong Jiang, Ph.D., Associate Professor

Department of Pharmacology

Alex M. Dopico, M.D., Ph.D., Professor and Chair

Suleiman W. Bahouth, Ph.D., Professor (deceased)

Anna Bukiya, Ph.D. Professor

Hao Chen, Ph.D., Associate Professor

Chang Hoon Jee, Ph.D., Assistant Professor

Dean Kirson, Ph.D., Assistant Professor

Francesca-Fang Liao, Ph.D., Professor

Kafait U. Malik, Ph.D., Professor

Kazuko Sakata, Ph.D., Associate Professor

Jeffery Steketee, Ph.D., Professor

Steven J. Tavalin, Ph.D., Associate Professor

Brendan Turnstall, Ph.D., Assistant Professor

Thirumalini Vaithianathan, Ph.D., Assistant Professor

Fu-Ming Zhou, M.D., Ph.D., Professor

Department of Physiology

Julio Cordero-Morales, Ph.D., Associate Professor

Ioannis Dragatsis, Ph.D., Professor

Jonathan Jaggar, Ph.D., Maury Bronstein Professor

*Djamel Lebeche, Ph.D., Professor

Helena Parfenova, Ph.D., Professor

Valeria Vásquez, Ph.D., Associate Professor

Paula Dietrich, Ph.D., Assistant Professor

Department of Preventive Medicine

Khyobeni Mozhui, Ph.D., Associate Professor

College of Nursing

Ansley Stanfill, Ph.D., Associate Professor

St. Jude Children's Hospital (see Departments Above for Affiliated Appointments)

Jay Bickoff, Ph.D., Assistant Professor

Michael Dyer, Ph.D., Professor

Alessandra D'Azzo, Ph.D., Professor

Peter McKinnon, Ph.D., Professor

James Morgan, Ph.D., Professor

Lindsay Schwarz, Ph.D., Assistant Professor

J. Paul Taylor, M.D., Ph.D., Professor

Stanislav Zakharenko, Ph.D., Professor

VI. GRADUATE STUDENTS & POSTDOCTORAL STUDENTS

***Graduate Students*:** The NI supports the Neuroscience Graduate Program, which is a division of the Biomedical Sciences Program at UTHSC. A description of the Neuroscience program can be found at: https://www.uthsc.edu/anatomy-neurobiology/neuroscience_graduate_program.php. This program is directed by NI members Dr. Max Fletcher (Track Director) and Dr. Matthew Ennis (Program head and Chair of Anatomy and Neurobiology). Students in this track take Functional Neuroanatomy, and 2 of 3 additional Core courses (Cellular Neuroscience, Behavioral Neuroscience, Developmental and Molecular Neuroscience), in addition to Statistics and Research Ethics. In addition, all graduate students must take the Neuroscience Seminar/Journal Club Class each year until they pass their qualifying exam, and all students participate in the student Neuroscience Symposium class every year, where they present their research. Both the Seminar and Symposium courses are coordinated and supported by NI. All students in good standing in the program are awarded matching stipends for at least 2 years (typically, years 3 and 4) of their Ph.D. research phase with the exception of students working at St. Jude Children's Hospital, which provides their complete stipend. The program had 16 students in FY 2023, including 4 who graduated. Two students were at St. Jude's (faculty mentors have affiliate faculty appointments in Anatomy & Neurobiology) while the other students were placed with faculty mentors at UTHSC in Anatomy & Neurobiology, Pediatrics (Division of Neurology), Neurology, Pharmacology and the College of Nursing.

In the last 8 years, four NI supported students have been awarded nationally competitive NIH F31 predoctoral fellowships during their graduate tenure: Sarah Neuner, Jordan Ross, Jessica Baker and Angela Taylor. Drs. Neuner and Ross graduated and left for postdocs several years ago, and Jessica Baker and Angela Taylor graduated in FY2021. These are the *only* UTHSC students from the larger Biomedical Sciences Program to have F31 fellowships.

***Postdoctoral Fellows**:* The NI supports matching postdoctoral fellowships to some extent every calendar year, and successful postdocs can receive support for a maximum of 2 years. In November 2022, we solicited applications for postdoctoral fellow support **(see Appendix 4)**. Seven applications were reviewed by the Neuroscience Executive Committee based on productivity and promise in neuroscience research and awards were made on a competitive basis to the following two candidates with Neuroscience Institute faculty mentors: Yu Chen (Pharmaceutical Sciences; Dr. Jiang) and Xiaoqin Huang (Ophthalmology, Dr. Yousefi). We also continued (and completed) support of 7 postdoctoral fellow awards made in FY22. Further information on postdoctoral awards is available at https://www.uthsc.edu/neuroscience-institute/education/postdoc-awards.php

VII. PROGRAM OVERVIEW AND ACCOMPLISHMENTS

OVERVIEW

***Organizational Structure*:** The Tennessee Higher Education Commission Neuroscience Center of Excellence comprises the administrative core and financial engine of the Neuroscience Institute (NI), which is located within UTHSC's College of Medicine in Memphis. Dr. Matthew Ennis is the Interim Director, and Dr. John Boughter is the Co-Director. The Director reports to the Executive Dean of the UTHSC College of Medicine, Scott Strome, M.D., and the UTHSC Vice Chancellor of Research, Wes Byerly, Ph.D. Physically the NI is housed within 13 different departments in 3 colleges (Medicine, Pharmacy, Nursing) with an administrative suite in Rm 426 Wittenborg Building at UTHSC. Affiliated members reside at UT Knoxville, St. Jude Children's Hospital, and LeBonheur Children's Hospital.

Dr. Ennis supervises Ms. Brandy Fleming, M.S., our Program Coordinator and also functions as our IT specialist. Ms. Fleming and Dr. Ennis supervise our administrative assistant, Mistie Brewer. With Ms. Fleming's help, the administrative assistant organizes the seminar series including all travel arrangements, assists in ordering and billing, and handles NI official correspondence. The Neuroscience Imaging Center is managed by Dr. Esther Marquez Wilkins, Ph.D., who reports directly to NI Director Ennis.

History: The Neuroscience Center of Excellence at UTHSC was established in 1985 and designated an accomplished Center of Excellence by the Tennessee Higher Education Commission in 1988. In 1998, the Neuroscience Center of Excellence was designated as the University of Tennessee Neuroscience Institute, with dedicated space in the Wittenborg, Link and Johnson buildings. The Neuroscience Center of Excellence award was designed to support graduate and postdoctoral research training and education, to recruit and provide initial support to new neuroscience faculty, to renovate laboratory facilities, to purchase research equipment, to host symposia, a weekly seminar series, and to support community outreach programs such as those associated with Brain Awareness Week. The Director from 1985-2002 was Dr. Steven T. Kitai (retired, 2002; deceased 2019). Dr. David Smith was named director from 2002-2006 (deceased, Sept. 2006). Dr. William Armstrong was director from 2006-2020. Dr. Matthew Ennis, Chair of the Department of Anatomy and Neurobiology, was selected as NI Interim Director by UTHSC administration in 2020 upon Dr. Armstrong's retirement.

The program brings together neuroscience faculty members from the Departments of Anatomy and Neurobiology, Genomics, Medicine, Neurology, Neurosurgery, Nursing, Ophthalmology, Pediatrics, Pharmaceutical Sciences, Pharmacology, Physiology, Preventive Medicine, Psychiatry, and the Department of Biochemistry and Cellular and Molecular Biology at the University of Tennessee, Knoxville. Strong affiliations exist with Methodist University Hospital, Le Bonheur Children's Hospital, St. Jude's Children Hospital, the University of Memphis, Rhodes College, and Christian Brother's University. The interdepartmental nature of the program and the collaborations it fosters provide the cross-disciplinary environment necessary for high quality neuroscience research.

***Neuroscience Administrative Suite and Conference Rooms*:** The NI maintains an administrative suite with offices for the Director, Program Coordinator, and Administrative Assistant in the Wittenborg Building, 4th floor (Room 426). This suite also contains 2 conference rooms, one large room for classes, lab meetings, and large committee meetings,

and a smaller room for small meetings. We also maintain a breakroom for the NI staff, graduate students, postdocs as well as for staff from the animal vivarium located in the basement of the Wittenborg building, which houses animals for Anatomy and Neurology, Physiology, and Neurology faculty.

Neuroscience Imaging Core: The NI maintains a full-service Imaging Center (https://www.uthsc.edu/neuroscience-institute/facilities/imaging-center.php) housing confocal and electron microscopes, 3-dimensional reconstruction workstations, microtomy facility and lab and office space for the Director of the Imaging Core, Dr. Esther Marquez Wilkins, located on the 3rd floor of the Link Building. This is a cost recovery facility that NI supports in order to keep costs low. Scheduling is on-line.

Neuroscience Behavioral Core: This core is located on the 3rd floor of Wittenborg building (https://www.uthsc.edu/neuroscience-institute/facilities/behavioral-core.php), and is managed by Dr. Mike McDonald of Neurology. NI helped recruit Dr. McDonald. Dr. McDonald personally trains users in the great variety of testing equipment available in this core; nearly all equipment in the core was generously donated by NI faculty. This core is free of use to any UTHSC faculty, but NI occasionally supplies equipment and software on an as-needs basis. Scheduling is on-line.

Neuroscience Institute Web Site: Our Program Coordinator, Ms. Brandy Fleming, maintains the NI website with assistance from IT at UTHSC (https://www.uthsc.edu/neuroscience-institute/). This site contains information about our cores, the graduate and postdoctoral support programs, undergraduate fellowships, conference room and core on-line scheduling, faculty funding, spotlights on new faculty, seminars and symposia, and a full list of participating departments and NI faculty members. Ms. Fleming maintains 2 servers for NI members. One server is for file exchange for users of the Imaging Center. All images are digitally acquired from our confocal and electron microscopes, and these can be uploaded to this site by users, stored for a month, and downloaded at their convenience during that period. We also maintain a second server for archiving all NI business.

Areas of Neuroscience Research

Neurological and Neurodegenerative Disorders

Neurological diseases include disorders of the nervous system arising from nervous system malfunction or degeneration. Current areas of focus within NI include: cellular and network physiology of basal ganglia in the context of Parkinson's disease, traumatic brain and eye injury, stroke, seizures/epilepsy, neuronal dysfunction and death in Huntington's disease, the molecular biology of synaptogenesis in dystonia, and animal models of Alzheimer's disease.

Faculty	**Department**	**Faculty**	**Department**
M. Khan	Neurology	I. Dragatsis	Physiology
D. Heck	Anatomy & Neurobiology	B. Jones	Genetics, Gen. Inform.
H. Kita	Anatomy & Neurobiology	F.-F. Liao	Pharmacology
L. Reiter	Neurology	T. Nowak	Neurology
T. Ishrat	Anatomy & Neurobiology	A. Reiner	Anat. & Neurobiology

D. Lebeche	Physiology	J. Wheless	Pediatric Neurology
J. Jiang	Pharmaceutical Sciences	S. Narayana	Pediatric Neurology
M. McDonald	Neurology	M. Mulligan	Genetics, Gen. Inform.
F. Zhou	Pharmacology	J. Taylor	Anatomy & Neurobiology
B. Moore	Pharmaceutical Sciences	J. Stanfill	Nursing
R. Gangaruju	Ophthalmology	P. Dietrich	Physiology

Excitable Properties of Neurons

Behavior, mentation and physiological homeostasis are all a function of neuronal activity in the nervous system. This activity can be encoded by membrane polarity or in the rates and patterns of neuronal action potentials. Information is passed among neurons through synaptic transmission.

Faculty	**Department**	**Faculty**	**Department**
R. Foehring	Anatomy & Neurobiology	H. Kita	Anatomy & Neurobiology
W. Armstrong	Anatomy & Neurobiology	J. Du	Anatomy & Neurobiology
J. Callaway	Anatomy & Neurobiology	S. Tavalin	Pharmacology
J. Cordero-Morales	Physiology	R. Waters	Anatomy & Neurobiology
A. Dopico	Pharmacology	V. Vásquez	Physiology
M. Ennis	Anatomy & Neurobiology	D. Heck	Anatomy & Neurobiology
F. Zhou	Pharmacology	A. Bukiya	Pharmacology
S. Zahkarenko	Anatomy & Neurobiology	T. Vaithianathan	Pharmacology

Sensory Information Processing

Sensory systems extract information from the environment and provide the nervous system an interface with the outside world. Understanding the way in which this information is represented in neuronal activity is the focus of this research group, which includes the study of olfaction, taste, pain, and vision.

Faculty	**Department**	**Faculty**	**Department**
M. Ennis	Anatomy & Neurobiology	R. Waters	Anatomy & Neurobiology
J. Boughter	Anatomy & Neurobiology	J. Du	Anatomy & Neurobiology
J. Cordero-Morales	Physiology	V. Vásquez	Physiology
M. Fletcher	Physiology	I. Kim	Anatomy & Neurobiology
D. Heck	Anatomy & Neurobiology		

Vision and Retina

Understanding the normal function of the eye and the way this process is affected by disease is the primary interest of this group. Researchers are addressing the normal development of the eye as well as the genetic basis of function and disease.

Faculty	**Department**	**Faculty**	**Department**
M. Dyer	Anatomy & Neurobiology	A. Reiner	Anatomy & Neurobiology
M. Jablonski	Ophthalmology	R. Williams	Genetics, Gen. Inform.
N. Mandal	Ophthalmology	S. Yousefi	Ophthalmology
TJ. Hollingworth.	Ophthalmology		

Neurogenetics and Development

This group is interested in gaining a deeper understanding of the origins of the impressive structural and functional complexity, diversity, and plasticity of the nervous system. Experimental and technical expertise of this group is broad, ranging from genetic and molecular analysis of the early stages of central and peripheral nervous system development to sophisticated functional assays of neuronal plasticity in response to environmental manipulations.

Faculty	Department	Faculty	Department
R. Williams	Genetics, Gen. Inform.	L. Lu	Genetics, Gen. Inform.
J. Boughter	Anatomy & Neurobiology	P. McKinnon	Anatomy & Neurobiology
V. Chizhikov	Anatomy & Neurobiology	J. Morgan	Anatomy & Neurobiology
A. d'Azzo	Anatomy & Neurobiology	K. Mozui	Preventive Medicine
I. Dragatsis	Physiology	A. Reiner	Anatomy & Neurobiology
K. Hamre	Anatomy & Neurobiology	L. Reiter	Neurology
M. Mulligan	Genetics, Gen. Inform.	M. Honig	Anatomy & Neurobiology
B. Jones	Genetics, Gen. Inform.		

Mental and Addictive Disorders

Mental and addictive disorders are due to changes in normal brain function. This research group collaboratively explores changes in brain function that might explain mental disorders, such as depression, schizophrenia, ADHD, anxiety, post-traumatic stress disorder and addiction, and drug-induced changes in brain function that may be responsible for relieving mental disorders or producing addiction.

Faculty	Department	Faculty	Department
H. Chen	Pharmacology	B. Sharp	Pharmacology
A. Dopico	Pharmacology	J. Steketee	Pharmacology
K. Hamre	Anatomy & Neurobiology	S. Tavalin	Pharmacology
K. Sakata	Pharmacology	F. Zhou	Pharmacology
I. Kim	Anatomy & Neurobiology	B. Turnstall	Anatomy & Neurobiology
A. Reiner	Anatomy & Neurobiology	D. Kirson	Pharmacology
M. Mulligan	Genetics, Gen. Inform.	L. Schwarcz	Anatomy & Neurobiology
J. Du	Anatomy & Neurobiology	R. Cowan	Psychiatry

ACCOMPLISHMENTS

Faculty support and recruitment: NI is currently disseminating start-up funds to 3 faculty. (1) Dr. Tauheed Ishrat, awarded $150,000 to be spent over 5 years. Dr. Ishrat was recruited in 2017 into Anatomy & Neurobiology as an associate professor with an R01. He is a stroke neurobiologist and is interested in factors that mitigate or exacerbate stroke susceptibility in a focal ischemia model. (2) Dr. Il Hwan Kim, $150,000 to be spent over 5 years. Dr. Kim was recruited in 2019 into Anatomy & Neurobiology as an assistant professor; his R01 funded research area is social behavior and schizophrenia. He received a second R01 in September 2022. (3) Dr. Jianyang Du, $100,000 to be spent over 5 years. Dr. Du was recruited in 2020 into Anatomy & Neurobiology as associate professor; his R01-funded research investigates social behavior and autism and he is working towards a second R01 in this area.

Acquisition of Equipment for Cores: In the past, NI has contributed matching funds for multi-user pieces of

equipment, including those obtained from NIH for an electron microscope, for two confocal microscopes and a computerized light microscope for three-dimensional neuronal reconstructions. In addition, NI partnered with UTHSC Research to obtain a high resolution digital camera attachment for the electron microscope and to upgrade the Zeiss 710 to a Zeiss 800 Airyscan confocal microscope. A separate post-image acquisition Zen workstation is available for off-line image analysis. The workstation is also equipped with Imaris software suite: (1) the Tracking XT Package which provides interactive processing, visualization and analysis software for 3D and 4D microscopic images; and (2) the ClearView Deconvolution 9.5 module for confocal image deconvolution. All are located in the Neuroscience Imaging Core and are maintained and supervised by a dedicated Technical Manager (Dr. Esther Marquez Wilkins) supported by the NI. This past year we renewed our service agreements for this imaging equipment. Additionally, we purchased a new Leica Cryostat as the previous one no longer worked and a new computer for the JEOL as the software on the existing computer could no longer be upgraded due to hardware incompatibility. The web site for the Imaging Center is: (https://www.uthsc.edu/neuroscience-institute/facilities/imaging-center.php) and features on-line scheduling for equipment use.

Research Support-Pilot Project Awards: Every several years, NI has supported pilot project research awards to NI faculty members. This program is intended to facilitate collaborative research by awarding research funds for the collection of pilot data or for the purchase of small equipment items to support multi-PI grant applications. Applications are reviewed by the Executive Committee and awarded on a competitive basis. This year, due to major equipment purchases the previous year, we did not request Pilot Project applications. We continued support to the Pilot Projects Awards made in the previous fiscal year to Drs. Chizhikov (Anatomy & Neurobiology), Fletcher (Anatomy & Neurobiology, and Zhou (Pharmacology). (**See Appendix X**)

Graduate Student Support and Recruiting: Our interdisciplinary Graduate Neuroscience Track attracts outstanding applicants from around the country, with an emphasis on those in the Mid-South. The NI pays 50% of their stipend for 2 years (years 3 and 4), the remainder is paid by their mentor. For FY23 we spent $59,508 on matching stipends for 4 students and another $1,500 on travel support. During FY23 we had 16 Neuroscience students, including 3 new students who entered in the Fall 2022. In Fall 2023 we recruited 3 new graduate students. Our recruiting flyer can be found at the end of **Appendix 4**.

***Postdoctoral Research Awards*.** The NI provided matching funds on a competitive basis for 7 postdoctoral fellows or research associates for FY23 (this includes 5 awarded in the previous calendar year) and 2 new awards. These awards range from $10,000-$15,000 each and totaled $34,261. The 2 postdocs newly awarded in FY23, and their NI faculty mentors and departments, are listed above under item VI.

***NI Neuroscience Seminar Series and Symposia*:** This series is a major mechanism for interaction among

neuroscience faculty, staff and students and brings outstanding neuroscientists from around the world to the UTHSC campus. During the 2022-2023 academic year, the NI sponsored the weekly Neuroscience Seminar Series, hosted 22 speakers, from outside UTHSC. The NI seminar series serves as the basis for a graduate course, Neuroscience Seminar (ANAT 821), which is attended by all neuroscience track IBS graduate students and within which they read papers by and meet with the visiting scientists (course director: Dr. Iskusnykh, Anatomy & Neurobiology). This seminar program is vital to the Neuroscience Track of the Graduate Program and to the entire UT neuroscience community, serving to keep our faculty and students abreast of recent developments and, perhaps even more important, to showcase our strengths to national and international leaders in neuroscience research visiting our campus. NI also coordinates the Spring Student Seminar course (course director: Dr. Fletcher, Anatomy & Neurobiology), where students give seminars and receive critical feedback from their colleagues. A complete list of the seminar speakers and their topics are provided in **Appendix 3**.

***Undergraduate Neuroscience Merit Scholarships*:** These are given to outstanding undergraduates at Rhodes College and Christian Brothers University (CBU); typically awards are made to those undergraduate students with a Neuroscience or Psychology major. The Rhodes and CBU scholars work on independent projects for their undergraduate thesis. We spent $6,644 supporting 2 scholarships in the summer of 2022 (after July 1, 2022, so part of FY2023). We are currently supporting two new students in summer 2023.

VIII. GOALS AND FUTURE PLANS

***Faculty Support and Recruitment*:** From time to time the Executive Dean of the College of Medicine asks NI to partner on start-up funds for neuroscience faculty recruits. The most recent recruits are listed above under Faculty support. NI will continue to partner on neuroscience faculty recruitments in consultation with UTHSC administration.

***Core Support**:* NI will continue to support the Imaging Center (including the microtomy facility), and Behavioral Core. This requires collecting and processing user fees, paying service contracts, and repairing/replacing equipment. Our confocal microscope and electron microscope/camera are very old and experiencing recurring problems; we will need to replace the confocal microscope (~$870,000) and the electron microscope camera (~$50,000). Further Details are found in the budget for FY24 below.

***Graduate Student Support and Recruiting**:* We expect to recruit 3 new students into the Neuroscience Track for Fall 2023. We will support matching stipends of 3 students during the next fiscal year beginning July 1, 2023. Dr. Fletcher will run the Neuroscience Student Symposium class with Drs. Ennis and Boughter assisting, and Dr. Iskusnykh will run the Neuroscience Seminar Series class for graduate students. The NI offers travel stipends ($500 per trip) to any Neuroscience student or supported postdoc for a national meeting if they are the first or presenting author of a talk or poster.

***Postdoctoral Research Awards*.** We will continue ongoing support to 2 postdocs. Depending on budgetary issues (allocation of NI start up funds to the recruit of a new Director, replacement of core equipment), we may continue to support new Postdoctoral Awards in FY24. These applications are competitive and ranked by the NI Executive Committee. See Budget for FY23 for further details.

***NI Neuroscience Seminar Series**:* We will continue to run the Neuroscience Seminar Series, which will be held in person or on-line by Zoom with the preference up to the individual speaker.

***Undergraduate Research Fellows*:** We will support ~2 undergraduate research fellows from Rhodes College or Christian Brothers University.

IX. BUDGET (see Schedule 7, page 21)

A. FY2023 The FY23 THEC appropriated budget for the NI was $667,652. We carried forward $324,782 from the previous year for a total budget of $992,434. This carryover reflects amounts encumbered but unspent for Graduate Stipends that were picked up previously by NI and are now picked up by UTHSC for the student's first 18 months, monies encumbered to support our new faculty hires for whom we provided startup packages (Drs. Ishrat, Du, and Kim) and any unspent funds from research award accounts. Additionally, the carry forward reflects funds for seminar arrangements (travel, per diem, hotel and honorarium) that were not expended due to Covid.

This past FY, we expended $441,103 total personnel costs (including salaries and fringe). Personnel costs include administrative supplements for the NI Director (who also directs the NI Imaging Center), the NI Co-Director, a full-time Program Coordinator/ IT specialist, a ¾ time Administrative Specialist, and a full time Technical Manager of Imaging Center as well as the students and postdocs mentioned below**.**

Students: We awarded matching or partial funds for 4 graduate stipends to NI faculty mentors with Neuroscience track graduate students for a total $59,508. The mentors were located in the departments of Anatomy and Neurobiology, Neurology, Pediatrics and in the College of Nursing.

***Postdoctoral Support**:* We provided matching funds for 7 postdoctoral fellows for a total $34,261. The NI faculty mentors and departments are listed above under item VI.

***Neuroscience Imaging Center*:** Currently the NI Imaging Center is run by Dr. Esther Marquez Wilkins. We supplement our cost-recovery program to keep user fees low, helping to pay the service contracts on our JEOL 2000 Electron Microscope, the Zeiss 710/800 confocal microscope, the Microbrightfield Neurolucida workstation, and the Imaris software suite (including the new modules purchased this past year as noted above). This year our cost-recovery

program took in $21,423 which was used against the fees needed to pay the service contracts on the Zeiss 710/Airyscan ($19,662) and the JEOL 2000 ($17,300). The cost recovery this FY was much less than previous years due to the restricted research operations during Covid-19. As noted above, to replace non-functional equipment, we purchased (1) a Leica Cryostat (CM3050, $54,508) and (2) a computer workstation ($7,850) for the JEOL as the software on the existing computer could no longer be upgraded due to hardware incompatibility. The equipment available for use can be viewed at: https://www.uthsc.edu/neuroscience-institute/facilities/imaging-center.php.

Neuroscience Behavioral Core: The procedures for use and available equipment can be viewed at: https://www.uthsc.edu/neuroscience-institute/facilities/behavioral-core.php. Due to the generally low cost of maintenance (Dr. McDonald generously trains new users at no charge and faculty provide their own research personnel to use the equipment), NI has not yet instituted fees for services in this facility.

***Seminars and Symposia*:** We spent $15,983 on travel and entertainment for the seminar speakers. We did pay honoraria ($3200) for the Neuroscience Seminar series (see **Appendix 3**).

***Research Project Support**:* We provided startup funds for Drs. Ishrat, Du, and Kim, who were awarded $150,000, $100,000 and $150,000, respectively (see details above under Accomplishments – Faculty Support and Recruitment). We continued support for 3 Pilot Projects awarded in FY22 ($15,000 each). Those receiving the awards were: Drs. Chizhikov (Anatomy & Neurobiology), Fletcher (Anatomy & Neurobiology, and Zhou (Pharmacology).

Undergraduate Fellowships: We spent $6,945 supporting these and 2 scholarships in the summer of 2022 (after July 1, 2022, so part of FY23) and 2 students who began research in summer 2023.

Travel Awards: As national and international research meetings have resumed with the cessation of Covid our expenditures in this area were back to normal levels. $3,000 in travel awards for graduate students and postdoctoral fellows were awarded.

B. FY2024. We will carryover $286,004 to the coming fiscal year and have been appropriated $691,114 for a total of $977,118. In addition to providing support for all the NI staff (Program Coordinator, Administrative Assistant, and Imaging Center Manager), here is a breakdown of the major anticipated projects for FY2024.

Students: For the coming year, we have awarded matching, or partial support, funds for 3 graduate stipends to NI faculty mentors with Neuroscience track graduate students. Mentors are located in Anatomy & Neurobiology and Neurology. The NI match is ~$14,500 each for 3 of these making an expected total of ~$43,500.

***Postdoctoral Support**:* We continued to provide funds for 2 postdoctoral fellows awards made in FY22 ($10,000-15,000 each for a total of ~$30,000). Some can be given to awardees from last year assuming good progress, with a maximum of 2 year's support.

***Neuroscience Imaging Center*:** We will pay/renew the service contracts on the: (1) JEOL 2000 ($17,300), (2) Zeiss 710/800 Confocal ($19,662), (3) Imaris software suite ($4,346), (4) Leica Glass Knife Maker ($585), and (7) Leica Ultramicrotome ($5,876). We will replace the confocal microscope (~$870,000 with partnering funds from the Department of Anatomy & Neurobiology) and the electron microscope camera (~$50,000).

***Neuroscience Behavioral Core**:* We will continue to support the Behavioral Core in FY2024, but expenditures are expected to be nil. However, should a need arise for additional equipment, or for a part-time assistant to help run behavioral studies, NI would consider additional funding assuming a fee for service program were approved and initiated.

***NI Faculty*:** We will provide administrative supplements to Dr. Ennis (until September 30, 2023, when Dr. Dobrunz becomes the NI Director), Dr. Dobrunz (beginning October 1, 2023) and Dr. Boughter. We are currently providing startup funds as to 3 faculty as detailed above: (1) $150,000 to Dr. Ishrat over 3-5 years to (2/01//2018-1/31/2023); (2) $150,000 to Dr. Kim over 3-5 years (to ~2024), and (3) $100,000 to Dr. Du over 3-5 years (to 2025). We limit NI expenditures for each faculty at no more than $50,000/year, and request that they use at least $30,000 per year should they wish to extend the full five years.

Research Projects and Bridge Funding: We can provide small amounts of bridge fund assistance, but this will be limited by our ongoing commitments to start-up fund packages noted above for Drs. Ishrat, Kim, and Du.

Seminar and Undergraduate Neuroscience Merit Fellowships. We will offer the Neuroscience Seminar series, currently offered in person or virtually on-line and featuring national and international speakers (on-line only). We will continue to fund summer Undergraduate Neuroscience Merit Fellowships to Rhodes and Christian Brothers University students who are doing research projects in Neuroscience towards fulfilling their degree requirements (from 2-3 awards, depending on qualifications).

Schedule 7

CENTERS OF EXCELLENCE ACTUAL, PROPOSED, AND REQUESTED BUDGET

Institution: University Of Tennessee Health Science Center **Center:** Neuroscience

	FY 2022-23 Actual			FY 2023-24 Proposed			FY 2024-25 Requested		
	Matching	Appropr.	Total	Matching	Appropr.	Total	Matching	Appropr.	Total
Expenditures									
Salaries									
Faculty	$581,557	$56,814	**$638,371**	$627,199	$78,110	**$705,309**	$646,015	$80,453	**$726,468**
Other Professional	$185,366	$186,128	**$371,494**	$53,851	$131,408	**$185,259**	$55,466	$135,350	**$190,817**
Clerical/ Supporting	$0	$35,866	**$35,866**	$0	$30,295	**$30,295**	$0	$31,204	**$31,204**
Assistantships	$70,000	$78,082	**$148,082**	$45,000	$76,596	**$121,596**	$46,350	$50,470	**$96,820**
Total Salaries (exclude Longevity)	**$836,923**	**$356,890**	**$1,193,813**	**$726,050**	**$316,409**	**$1,042,459**	**$747,831**	**$297,477**	**$1,045,309**
Longevity (Excluded from Salaries)	$0	$2,602	**$2,602**	$0	$560	**$560**	$0	$577	**$577**
Fringe Benefits	$145,277	$101,047	**$246,324**	$152,189	$87,560	**$239,749**	$156,755	$90,187	**$246,942**
Total Personnel	**$982,200**	**$460,540**	**$1,442,740**	**$878,239**	**$404,529**	**$1,282,768**	**$904,586**	**$388,241**	**$1,292,827**
Non-Personnel									
Travel	$0	$15,987	**$15,987**	$0	$30,000	**$30,000**	$0	$30,900	**$30,900**
Software	$0	$0	**$0**	$0	$0	**$0**	$0	$0	**$0**
Books & Journals	$0	$0	**$0**	$0	$0	**$0**	$0	$0	**$0**
Other Supplies	$0	$123,202	**$123,202**	$0	$240,209	**$240,209**	$0	$76,949	**$76,949**
Equipment	$0	$62,358	**$62,358**	$0	$163,745	**$163,745**	$0	$50,000	**$50,000**
Maintenance	$0	$255	**$255**	$0	$20,000	**$20,000**	$0	$23,221	**$23,221**
Scholarships	$0	$0	**$0**	$0	$0	**$0**	$0	$0	**$0**
Consultants	$0	$0	**$0**	$0	$0	**$0**	$0	$0	**$0**
Other (Specify):	$0	$0		$0	$0		$0	$0	
Printing, Duplicating, Binding	$0	$67	**$67**	$0	$100	**$100**	$0	$103	**$103**
Postage, Freight, & Telephone	$0	$288	**$288**	$0	$100	**$100**	$0	$103	**$103**
Professional Serv & Memberships	$0	$47,059	**$47,059**	$0	$55,000	**$55,000**	$0	$56,650	**$56,650**
Insurance & Interest	$0	$4,536	**$4,536**	$0	$4,000	**$4,000**	$0	$4,120	**$4,120**
Rentals	$0	$2,773	**$2,773**	$0	$3,500	**$3,500**	$0	$3,605	**$3,605**
Grants & Subsidies	$0	$0	**$0**	$0	$50,000	**$50,000**	$0	$115,983	**$115,983**
Contractual & Special Services	$0	$6,870	**$6,870**	$0	$7,000	**$7,000**	$0	$7,210	**$7,210**
Other Expenditures	$0	-$20,728	**-$20,728**	$0	-$20,000	**-$20,000**	$0	-$20,600	**-$20,600**
Entertainment, Food & Housing	$0	$3,843	**$3,843**	$0	$4,000	**$4,000**	$0	$4,120	**$4,120**
Facilities & Admin	$0	$0	**$0**	$0	$0	**$0**	$0	$0	**$0**
Direct Cost Sharing	$0	-$620	**-$620**	$0	$0	**$0**	$0	$0	**$0**
Total Non-Personnel	**$0**	**$245,890**	**$245,890**	**$0**	**$557,654**	**$557,654**	**$0**	**$352,364**	**$352,364**
GRAND TOTAL	**$982,200**	**$706,430**	**$1,688,630**	**$878,239**	**$962,183**	**$1,840,422**	**$904,586**	**$740,605**	**$1,645,191**
Revenue									
New State Appropriation	$0	$667,652	**$667,652**	$0	$691,114	**$691,114**	$0	$725,670	**$725,670**
Carryover State Appropriation	$0	$324,782	**$324,782**	$0	$286,004	**$286,004**	$0	$14,935	**$14,935**
New Matching Funds	$982,200	$0	**$982,200**	$878,239	$0	**$878,239**	$904,586	$0	**$904,586**
Carryover from Previous Matching Funds	$0	$0	**$0**	$0	$0	**$0**	$0	$0	**$0**
Total Revenue	**$982,200**	**$992,434**	**$1,974,633**	**$878,239**	**$977,118**	**$1,855,357**	**$904,586**	**$740,605**	**$1,645,191**

X. FACULTY PUBLICATIONS

The Neuroscience faculty at UTHSC is consistently productive, both in terms of peer-reviewed publications and participation in the national neuroscience community. Lists of peer-reviewed journal publications during the last academic year, as cited in PubMed are presented in **Appendix 2**. These PubMed-cited publications do not include the many chapters, reviews and other articles written by NI faculty. NI faculty members are indicated in **bold** in **Appendix 2. NI members published 246 papers.**

XI. EXTRAMURAL FUNDING OF NEUROSCIENCE FACULTY

The total annual grant dollars (total costs) currently held by UTHSC NI faculty (*i.e.,* excluding affiliate members, such as St. Jude, and excluding grants in no cost extensions) is **$20,579,980**, up from **$19,632,057** reported last year. The research grants (current year total costs) currently held by individual NI faculty are listed by Principal Investigator in **Appendix 1**. These values are reported to us by Research Administration at UTHSC. **Appendix 4** includes some highlights of publications and grants recently awarded to NI faculty.

APPENDIX 1
External Funding of Neuroscience Institute Faculty
FY 2022-2023

Lead PI	Department	Project Title	Sponsor	Award Number	Begin Date	End Date	Total Amount
Boughter, John	Anatomy and Neurobiology	The Neural Organization of Taste Neophobia	HHS - NIH - NIDCD - National Institute on Deafness and Other Communication Disorders	A23-0255-001	8/2/2022	7/31/2023	$385,000
Bukiya, Anna	Pharmacology	Fetal alcohol exposure and cerebrovascular development	University of South Florida (USF)	A22-0351-006	3/1/2023	2/29/2024	$164,253
Bukiya, Anna	Pharmacology	Fetal alcohol exposure and cerebrovascular development	University of South Florida (USF)	A22-0351-004	7/4/2022	2/28/2023	$23,567
Bukiya, Anna	Pharmacology	Fetal cerebral arteries and prenatal alcohol exposure	HHS - NIH - NIAAA - National Institute on Alcohol Abuse and Alcoholism	A22-1017-008	2/1/2023	1/31/2024	$609,370
Bukiya, Anna	Pharmacology	Fetal cerebral arteries and prenatal alcohol exposure	HHS - NIH - NIAAA - National Institute on Alcohol Abuse and Alcoholism	A22-1017-008	2/1/2023	1/31/2024	$609,370
Chen, Hao	Pharmacology	Reduced complexity mapping of oxycodone self-administrationand stress responsiveness in rats	HHS - NIH - NIDA - National Institute on Drug Abuse	A20-1080-012	3/1/2023	2/28/2024	$343,273
Chen, Hao	Pharmacology	System genetics of menthol and nicotine addiction	HHS - NIH - NIDA - National Institute on Drug Abuse	A19-0991-014	1/1/2023	12/31/2023	$540,216
Chizhikov, Viktor	Anatomy and Neurobiology	Nf2-dependent regulation of neuronal scaling in the developing cerebellum	HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke	A22-1364-008	6/1/2023	5/31/2024	$426,364
Cordero-Morales, Julio	Physiology	The Role of Sensory Receptors in Angelman Syndrome	HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke	A23-0828-001	2/15/2023	1/31/2024	$512,103
Cordero-Morales, Julio	Physiology	Sensory Ion Channel Modulation by Bioactive Lipids	HHS - NIH - NIGMS - National Institute of General Medical Sciences	A23-1068-001	4/1/2023	1/31/2024	$422,112
Cowan, Ronald	Psychiatry	Sex differences in pain reports and brain activation in older adults with Alzheimers disease	Ohio State University (OSU)	A21-1356-007	7/4/2022	5/31/2023	$51,839
Cowan, Ronald	Psychiatry	Helping Hands - American Psychiatry Association Foundationfor Jakub Denkiewicz - jdenkiew@uthsc.edu	American Psychiatric Foundation	A23-0984-001	11/1/2022	11/1/2023	$5,000
Dopico, Alejandro	Pharmacology	Ionic mechanisms of toluene cerebrovascular actions	HHS - NIH - NIEHS - National Institute of Environmental Health Sciences	A22-1427-004	3/1/2023	2/29/2024	$432,183
Dopico, Alejandro	Pharmacology	Cholesterol regulation of smooth muscle BK channel proteins and consequent control of cerebral artery diameter	HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute	A21-0096-008	7/1/2022	6/30/2023	$568,094
Dopico, Alejandro	Pharmacology	Cholesterol regulation of smooth muscle BK channel proteins and consequent control of cerebral artery diameter	HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute	A21-0096-008	7/1/2022	6/30/2023	$568,094
Dopico, Alejandro	Pharmacology	Ethanol Actions on SLO Channels from Arteries vs. Brain	HHS - NIH - NIAAA - National Institute on Alcohol Abuse and Alcoholism	A01-0745-047	9/15/2022	8/31/2023	$507,693
Dopico, Alejandro	Pharmacology	Ethanol Actions on SLO Channels from Arteries vs. Brain	HHS - NIH - NIAAA - National Institute on Alcohol Abuse and Alcoholism	A01-0745-047	9/15/2022	8/31/2023	$507,693
Du, Jianyang	Anatomy and Neurobiology	CFTR activators regulate emotional behaviors	Cystic Fibrosis Foundation	A22-0731-005	11/1/2022	10/31/2023	$53,596
Du, Jianyang	Anatomy and Neurobiology	The mechanism of cell size regulation by polycystins	University of Toledo (UT)	A23-0497-001	7/4/2022	3/31/2023	$10,953
Fletcher, Max	Anatomy and Neurobiology	Cholinergic modulation of olfactory bulb glomerular sensitivity	HHS - NIH - NIDCD - National Institute on Deafness and Other Communication Disorders	A15-0771-028	6/1/2023	5/31/2024	$460,908
Gangaraju, Raja Shekhar	Ophthalmology	Regulation of Mesenchymal Stem Cell Secretome for Treatment of Microglia Damage in Traumatic Brain Injury	HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke	A23-0256-001	8/3/2022	7/31/2023	$539,000
Gangaraju, Raja Shekhar	Ophthalmology	Novel engineered extracellular vesicles for blast injury to the retina:	University of Illinois Board of Trustees (BOT UI)	A23-0849-001	9/1/2022	5/31/2023	$128,756
Gangaraju, Raja Shekhar	Ophthalmology	TSG6 Exosomes for Treatment of Visual Dysfunction as Related to Military-Relevant Trauma	DOD - Department of Defense	A23-0204-001	7/15/2022	7/14/2023	$184,378
Hollingsworth, TJ	Ophthalmology	Suppression of Chronic Retinal Inflammation to Maintain Visual Function in a Spontaneous Polygenetic Mouse Model of Early Onset Inherited Retinal Dystrophy	Knights Templar Eye Foundation	A23-0111-001	7/1/2022	6/30/2023	$70,000
Jablonski, Monica	Ophthalmology	Novel Extended Release Glaucoma Therapy for Once Daily Dosing	HHS - NIH - NEI - National Eye Institute	A20-0897-012	3/1/2023	2/29/2024	$938,961
Jablonski, Monica	Ophthalmology	Novel Atrophic AMD therapy, delivery platform and preclinical models	Owen Locke Foundation	A23-0569-001	7/1/2022	6/30/2023	$37,500
Jaggar, Jonathan	Physiology	Chloride channels in endothelial cells	HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute	A23-0901-001	3/1/2023	2/28/2024	$627,553
Jaggar, Jonathan	Physiology	SK3 channel trafficking in endothelial cells	HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute	A22-0106-009	5/1/2023	4/30/2024	$635,955
Jaggar, Jonathan	Physiology	PKD proteins in endothelial cells	HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute	A21-0805-011	2/1/2023	1/31/2024	$602,338
Jiang, Jianxiong	Pharmaceutical Sciences	Inflammatory regulation of neurotrophin signaling in epileptogenesis	HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke	A19-0531-020	12/1/2022	11/30/2023	$299,250
Jiang, Jianxiong	Pharmaceutical Sciences	Targeting TRPC3 Channels for Epileptic Seizures	HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke	A22-0630-007	12/1/2022	11/30/2023	$38,000
Jiang, Jianxiong	Pharmaceutical Sciences	Targeting TRPC3 Channels for Epileptic Seizures	HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke	A22-0630-006	12/1/2022	11/30/2023	$342,000

Jones, Byron	Genetics, Genomics & Informatics	Genetics of epigenetic response to high circulating glucocorticoids and organophosphorus compounds	HHS - NIH - NIEHS - National Institute of Environmental Health Sciences	A21-1026-009	2/1/2023	1/31/2024	$580,839
Khan, Mohammad Moshahid	Neurology	LncRNA Malat1 as a potential therapeutic target for Alzheimer's Disease	University of Texas - Rio Grande Valley (UTRGV)	A23-0970-001	11/1/2022	10/31/2023	$25,000
Khan, Mohammad Moshahid	Neurology	Development of a novel gene therapy for the treatment of tauopathy	HHS - NIH - NIA - National Institute on Aging	A23-0207-001	7/15/2022	6/30/2023	$154,000
Khan, Mohammad Moshahid	Neurology	Novel DNA damage-Based Mechanisms and Therapeutics for Parkinson's disease	HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke	A23-0320-001	8/19/2022	7/31/2023	$211,750
Khan, Mohammad Moshahid	Neurology	Oligonucleotide-based therapy for Frontotemporal Degeneration	DOD - Department of Defense	A23-0661-001	1/1/2023	12/31/2023	$154,000
Kim, Il Hwan	Anatomy and Neurobiology	Subaward agreement to Virigina Tech	Virginia Tech (VT)	A23-0772-001	9/1/2022	8/31/2023	$369,598
Kirson, Dean	Pharmacology	Hypothalamic oxytocin influence on extended amygdala CRF neurons in alcohol dependence	HHS - NIH - NIAAA - National Institute on Alcohol Abuse and Alcoholism	A22-0400-006	9/1/2022	8/31/2023	$249,000
Mandal, Nawajes	Ophthalmology	Sphingolipids and their Impact in Corneal Wound Healing	HHS - NIH - NEI - National Eye Institute	A21-0119-013	6/1/2023	5/31/2024	$405,358
Mozhui, Khyobeni	Preventive medicine	Functional genetic analysis of epigenetic age acceleration and the regulatory landscape of the methylome	HHS - NIH - NIA - National Institute on Aging	A23-0313-001	9/1/2022	8/31/2023	$315,415
Narayana, Shalini	Pediatrics-Neurology	A National Consortium of Pediatric TMS Centers: Creating Infrastructure to Improve Language Mapping and Support Neurosurgical Decision Making	Pediatric Epilepsy Research Foundation (PERF)	A23-0354-001	9/1/2022	8/31/2023	$100,000
North, Kelsey Dopico Alejandro	Pharmacology	Pregnenolone constricts cerebral vascular arteries through the direct modulation of BK ion channels	HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute	A22-0060-005	8/1/2022	7/31/2023	$46,752
Nowak, Thaddeus	Neurology	Genetics of stroke vulnerability in C57BL/6 mouse substrains	HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke	A21-0161-009	7/1/2022	6/30/2023	$285,760
Parfenova, Elena	Physiology	Endothelial Vasoprotection by Hypothermia	HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke	A19-0281-011	7/1/2022	6/30/2023	$424,069
Prosser, Rebecca	Biochem/cell & molec biology	Does dantrolene attenuate the initial toxicity of Alzheimer's Disease peptides in young, old, and Alzheimer's mouse model brain tissue?	University of Tennessee Medical Center (UTMC)	A22-1384-001	6/1/2022	5/31/2023	$25,000
Reiter, Lawrence	Neurology	Development of an Assay for Circadian Rhythm Defects in Prader-Willi Syndrome	Foundation for Prader -Willi Research	A23-0867-001	2/1/2023	1/31/2024	$150,000
Reiter, Lawrence	Neurology	The role of UBE3A in gliopathic seizures.	HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke	A21-0405-009	8/1/2022	7/31/2023	$404,130
Sharp, Burt	Genetics, Genomics & Informati	Genetics of oxycodone intake in a hybrid rat diversity panel	HHS - NIH - NIDA - National Institute on Drug Abuse	A21-1067-010	2/1/2023	1/31/2024	$680,347
Sharp, Burt	Genetics, Genomics & Informati	Genetics of oxycodone intake in a hybrid rat diversity panel	HHS - NIH - NIDA - National Institute on Drug Abuse	A21-1067-010	2/1/2023	1/31/2024	$680,347
Stanfill, Ansley	Nursing-Research Programs	The utility of the Neuro-QoL measures to trigger neuropsychological assessment post-aneurysmal subarachnoid hemorrhage: A pilot study	National Academy of Neuropsychology (NAN)	A22-0688-003	10/1/2022	9/30/2023	$7,500
Tavalin, Steven	Pharmacology	Actions of proline at receptors and synapses	HHS - NIH - NIMH - National Institute of Mental Health	A23-0206-001	8/1/2022	7/31/2023	$192,500
Tsao, Jack	Anatomy and Neurobiology	Investigations into the Etiology of Phantom Limb Sensations and Phantom Limb Pain	HHS - NIH - NICHD - Eunice Kennedy Shriver National Institute of Child Health and Human Development	A19-0306-013	5/31/2023	4/30/2024	$522,201
Vaithianathan, Thirumalini	Pharmacology	Dynamics of calcium signals control neurotransmitter release in retinal ribbon synapses	HHS - NIH - NEI - National Eye Institute	A21-0710-012	1/1/2023	12/31/2023	$380,000
Vasquez, Valeria	Physiology	Regulation of mechanosensitive ion channels by membrane lipids.	HHS - NIH - NIGMS - National Institute of General Medical Sciences	A20-0151-011	7/1/2022	6/30/2023	$326,800
Vasquez, Valeria	Physiology	Studying prolonged nociceptors sensitization by TRPV1 combining a spider toxin and C. elegans	US-Israel Binational Science Foundation	A21-0115-005	10/1/2022	11/30/2023	$40,000
Williams, Robert	Genetics, Genomics & Informati	A Unified High Performance Web Service for Systems Genetics and Precision Medicine	HHS - NIH - NIGMS - National Institute of General Medical Sciences	A17-0993-017	7/1/2022	6/30/2023	$428,987
Williams, Robert	Genetics, Genomics & Informati	Imaging Genetics of Brain Structure and Cognitive Aging in Murine Models of Alzheimer's Disease	HHS - NIH - NIA - National Institute on Aging	A21-0777-010	2/1/2023	1/31/2024	$1,231,314
Yousefi, Siamak	Ophthalmology	Improved Glaucoma Monitoring Using Artificial-Intelligence Enabled Dashboard	HHS - NIH - NEI - National Eye Institute	A21-0296-007	9/1/2022	8/31/2023	$100,000
Yousefi, Siamak	Ophthalmology	Predicting the risk of glaucoma from structural, functional, and genetic factors using artificial intelligence.	HHS - NIH - NEI - National Eye Institute	A22-1076-009	4/1/2023	3/31/2024	$443,851
TOTAL							**$20,579,890**

APPENDIX 2

Faculty Publications (PubMed)

FY 2022-2023

Peer-reviewed publications for 2022-2023 (cited in PubMed):

1. Aditi, Downing, S. M., Schreiner, P. A., Kwak, Y. D., Li, Y., Shaw, T. I., Russell, H. R., & **McKinnon, P. J.** (2021). Genome instability independent of type I interferon signaling drives neuropathology caused by impaired ribonucleotide excision repair. *Neuron, 109*(24), 3962-3979 e3966. doi:10.1016/j.neuron.2021.09.040
2. Agrawal, M., Rasiah, P. K., Bajwa, A., Rajasingh, J., & **Gangaraju, R.** (2021). Mesenchymal Stem Cell Induced Foxp3(+) Tregs Suppress Effector T Cells and Protect against Retinal Ischemic Injury. *Cells, 10*(11). doi:10.3390/cells10113006
3. Ahmed, H. A., & **Ishrat, T.** (2022). Candesartan Effectively Preserves Cognition in Senescence Accelerated Mouse Prone 8 (SAMP8) mice. *J Alzheimers Dis Rep, 6*(1), 257-269. doi:10.3233/ADR-220016
4. Ahmed, H. A., & **Ishrat, T.** (2022). Repurposing verapamil for prevention of cognitive decline in sporadic Alzheimer's disease. *Neural Regen Res, 17*(5), 1018-1019. doi:10.4103/1673-5374.324843
5. Ahmed, H. A., Ismael, S., Mirzahosseini, G., & **Ishrat, T.** (2021). Verapamil Prevents Development of Cognitive Impairment in an Aged Mouse Model of Sporadic Alzheimer's Disease. *Mol Neurobiol, 58*(7), 3374-3387. doi:10.1007/s12035-021-02350-9
6. Al-Timemy, A. H., Mosa, Z. M., Alyasseri, Z., Lavric, A., Lui, M. M., Hazarbassanov, R. M., & **Yousefi, S.** (2021). A Hybrid Deep Learning Construct for Detecting Keratoconus From Corneal Maps. *Transl Vis Sci Technol, 10*(14), 16. doi:10.1167/tvst.10.14.16
7. Albadari, N., Deng, S., **Chen, H.**, Zhao, G., Yue, J., Zhang, S., **Miller, D. D.**, Wu, Z., & Li, W. (2021). Synthesis and biological evaluation of selective survivin inhibitors derived from the MX-106 hydroxyquinoline scaffold. *Eur J Med Chem, 224*, 113719. doi:10.1016/j.ejmech.2021.113719
8. Alehossein, P., Taheri, M., Tayefeh Ghahremani, P., Dakhlallah, D., Brown, C. M., **Ishrat, T.**, & Nasoohi, S. (2022). Transplantation of Exercise-Induced Extracellular Vesicles as a Promising Therapeutic Approach in Ischemic Stroke. *Transl Stroke Res*. doi:10.1007/s12975-022-01025-4
9. Alleyne, J., & **Dopico, A. M.** (2021). Alcohol Use Disorders and Their Harmful Effects on the Contractility of Skeletal, Cardiac and Smooth Muscles. *Adv Drug Alcohol Res, 1*. doi:10.3389/ADAR.2021.10011
10. Almeida, C., Pongilio, R. P., Movio, M. I., Higa, G. S. V., Resende, R. R., **Jiang, J.**, Kinjo, E. R., & Kihara, A. H. (2022). Distinct Cell-specific Roles of NOX2 and MyD88 in Epileptogenesis. *Front Cell Dev Biol, 10*, 926776. doi:10.3389/fcell.2022.926776
11. Annunziata, I., Weesner, J. A., & **d'Azzo, A.** (2021). Isolation of Mitochondria-Associated ER Membranes (MAMs), Synaptic MAMs, and Glycosphingolipid Enriched Microdomains (GEMs) from Brain Tissues and Neuronal Cells. *Methods Mol Biol, 2277*, 357-370. doi:10.1007/978-1-0716-1270-5_22
12. Bagchi, A., Orr, B. A., Campagne, O., Dhanda, S., Nair, S., Tran, Q., Christensen, A. M., Gajjar, A., Furtado, L. V., Vasilyeva, A., **Boop, F.**, Stewart, C., & Robinson, G. W. (2021). Lorlatinib in a Child with ALK-Fusion-Positive High-Grade Glioma. *N Engl J Med, 385*(8), 761-763. doi:10.1056/NEJMc2101264
13. Banerjee, S., Mahmud, F., Deng, S., Ma, L., Yun, M. K., Fakayode, S. O., Arnst, K. E., Yang, L., **Chen, H.**, Wu, Z., Lukka, P. B., Parmar, K., Meibohm, B., White, S. W., Wang, Y., Li, W., & **Miller, D. D.** (2021). X-ray Crystallography-Guided Design, Antitumor Efficacy, and QSAR Analysis of Metabolically Stable Cyclopenta-Pyrimidinyl Dihydroquinoxalinone as a Potent Tubulin Polymerization Inhibitor. *J Med Chem, 64*(17), 13072-13095. doi:10.1021/acs.jmedchem.1c01202
14. Banerjee, S., Yadav, S., Banerjee, S., Fakayode, S. O., Parvathareddy, J., Reichard, W., Surendranathan, S., Mahmud, F., Whatcott, R., Thammathong, J., Meibohm, B., **Miller, D. D.**, Jonsson, C. B., & Dubey, K. D. (2021). Drug Repurposing to Identify Nilotinib as a Potential SARS-CoV-2 Main Protease Inhibitor: Insights from a Computational and In Vitro Study. *J Chem Inf Model, 61*(11), 5469-5483. doi:10.1021/acs.jcim.1c00524
15. Batschelett, M., Gibbs, S., Holder, C. M., Holcombe, B., **Wheless, J. W.**, & **Narayana, S.** (2022). Plasticity in the developing brain: neurophysiological basis for lesion-induced motor reorganization. *Brain Commun, 4*(1), fcab300. doi:10.1093/braincomms/fcab300

16. Beasley, M. M., Gunawan, T., **Tunstall, B. J.**, & Kearns, D. N. (2022). Intermittent access training produces greater motivation for a non-drug reinforcer than long access training. *Learn Behav*. doi:10.3758/s13420-022-00512-w
17. Bourgault, A. M., Voss, J. G., **Stanfill, A. G.**, McCarthy, A. M., Matthews, E. E., Talsma, A., Loerzel, V., Henderson, W. A., Kinser, P. A., & Hershberger, P. E. (2022). Strategies to enhance the success of mid-career nurse scientists. *Nurs Outlook, 70*(1), 127-136. doi:10.1016/j.outlook.2021.06.015
18. Braden, A. A., Weatherspoon, S. E., Boardman, T., Williard, T., Adkins, A., Gibbs, S. K., **Wheless, J. W.**, & **Narayana, S.** (2022). Image-guided TMS is safe in a predominately pediatric clinical population. *Clin Neurophysiol, 137*, 193-206. doi:10.1016/j.clinph.2022.01.133
19. Broadbear, J. H., Depoortere, R. Y., Vacy, K., Ralph, D., **Tunstall, B. J.**, & Newman-Tancredi, A. (2021). Discriminative stimulus properties of the 5-HT1A receptor biased agonists NLX-101 and F13714, in rats trained to discriminate 8-OH-DPAT from saline. *Behav Pharmacol, 32*(8), 652-659. doi:10.1097/FBP.0000000000000659
20. Brown Lobbins, M. L., Scott, I. O., Slominski, A. T., Hasty, K. A., Zhang, S., **Miller, D. D.**, Li, W., Kim, T. K., Janjetovic, Z., Patel, T. S., Myers, L. K., & Postlethwaite, A. E. (2021). 17,20S(OH)2pD Can Prevent the Development of Skin Fibrosis in the Bleomycin-Induced Scleroderma Mouse Model. *Int J Mol Sci, 22*(16). doi:10.3390/ijms22168926
21. Brown Lobbins, M. L., Slominski, A. T., Hasty, K. A., Zhang, S., **Miller, D. D.**, Li, W., Kim, T. K., Janjetovic, Z., Tuckey, R. C., Scott, I. O., Myers, L. K., & Postlethwaite, A. E. (2021). Modulation by 17,20S(OH)2pD of Fibrosis-Related Mediators in Dermal Fibroblast Lines from Healthy Donors and from Patients with Systemic Sclerosis. *Int J Mol Sci, 23*(1). doi:10.3390/ijms23010367
22. Buddington, R. K., Yakimkova, T., Adebiyi, A., **Chizhikov, V. V.**, Iskusnykh, I. Y., & Buddington, K. K. (2021). Organ Growth and Intestinal Functions of Preterm Pigs Fed Low and High Protein Formulas With or Without Supplemental Leucine or Hydroxymethylbutyrate as Growth Promoters. *Front Nutr, 8*, 687703. doi:10.3389/fnut.2021.687703
23. Campos, Y., Nourse, A., Tanwar, A., Kalathur, R., Bonten, E., & **d'Azzo, A.** (2022). Biophysical and functional study of CRL5(Ozz), a muscle specific ubiquitin ligase complex. *Sci Rep, 12*(1), 7820. doi:10.1038/s41598-022-10955-w
24. Cascino, G. D., Tarquinio, D., **Wheless, J. W.**, Hogan, R. E., Sperling, M. R., Liow, K., Desai, J., Davis, C., Rabinowicz, A. L., Carrazana, E., & Group, D. S. (2021). Lack of observed tolerance to diazepam nasal spray (Valtoco(R)) after long-term rescue therapy in patients with epilepsy: Interim results from a phase 3, open-label, repeat-dose safety study. *Epilepsy Behav, 120*, 107983. doi:10.1016/j.yebeh.2021.107983
25. Chekuri, A., Logan, E. M., Krauson, A. J., Salani, M., Ackerman, S., Kirchner, E. G., Bolduc, J. M., Wang, X., **Dietrich, P.**, **Dragatsis, I.**, Vandenberghe, L. H., Slaugenhaupt, S. A., & Morini, E. (2022). Selective retinal ganglion cell loss and optic neuropathy in a humanized mouse model of familial dysautonomia. *Hum Mol Genet, 31*(11), 1776-1787. doi:10.1093/hmg/ddab359
26. **Chen, H.**, Deng, S., Albadari, N., Yun, M. K., Zhang, S., Li, Y., Ma, D., Parke, D. N., Yang, L., Seagroves, T. N., White, S. W., **Miller, D. D.**, & Li, W. (2021). Design, Synthesis, and Biological Evaluation of Stable Colchicine-Binding Site Tubulin Inhibitors 6-Aryl-2-benzoyl-pyridines as Potential Anticancer Agents. *J Med Chem, 64*(16), 12049-12074. doi:10.1021/acs.jmedchem.1c00715
27. Chen, J., Akomolafe, O. I., **Jiang, J.**, & Peng, C. (2021). Light-Actuated Liquid Crystal Elastomer Prepared by Projection Display. *Materials (Basel), 14*(23). doi:10.3390/ma14237245
28. Chilakala, S. K., **Parfenova, H.**, & **Pourcyrous, M.** (2021). The effects of sodium bicarbonate infusion on cerebrovascular function in newborn pigs. *Pediatr Res*. doi:10.1038/s41390-021-01876-x
29. Choi, E. Y., Li, D., Fan, Y., Pasquale, L. R., Shen, L. Q., Boland, M. V., Ramulu, P., **Yousefi, S.**, De Moraes, C. G., Wellik, S. R., Myers, J. S., Bex, P. J., Elze, T., & Wang, M. (2021). Predicting Global Test-Retest Variability of Visual Fields in Glaucoma. *Ophthalmol Glaucoma, 4*(4), 390-399. doi:10.1016/j.ogla.2020.12.001
30. Clark, R., & **Stanfill, A. G.** (2021). Lessons Learned From Pairing Education-Intensive and Research-Intensive Faculty to Increase Scholarship in Nursing. *Nurs Educ Perspect, 42*(5), 323-324. doi:10.1097/01.NEP.0000000000000822

31. Clay, M. R., Patel, A., Tran, Q., Hedges, D. J., Chang, T. C., Stewart, E., Charville, G., Cline, C., **Dyer, M. A.**, & Orr, B. A. (2021). Methylation profiling reveals novel molecular classes of rhabdomyosarcoma. *Sci Rep, 11*(1), 22213. doi:10.1038/s41598-021-01649-w
32. Collyer, J., Xu, F., Munkhsaikhan, U., Alberson, N. F., Orgil, B. O., Zhang, W., Czosek, R. J., **Lu, L.**, Jefferies, J. L., Towbin, J. A., & Purevjav, E. (2022). Combining whole exome sequencing with in silico analysis and clinical data to identify candidate variants in pediatric left ventricular noncompaction. *Int J Cardiol, 347*, 29-37. doi:10.1016/j.ijcard.2021.11.001
33. Conde-Dusman, M. J., Dey, P. N., Elia-Zudaire, O., Rabaneda, L. G., Garcia-Lira, C., Grand, T., Briz, V., Velasco, E. R., Andero, R., Ninerola, S., Barco, A., Paoletti, P., Wesseling, J. F., Gardoni, F., **Tavalin, S. J.**, & Perez-Otano, I. (2021). Control of protein synthesis and memory by GluN3A-NMDA receptors through inhibition of GIT1/mTORC1 assembly. *Elife, 10*. doi:10.7554/eLife.71575
34. Corradi, V., Bukiya, A. N., Miranda, W. E., Cui, M., Plant, L. D., Logothetis, D. E., Tieleman, D. P., Noskov, S. Y., & Rosenhouse-Dantsker, A. (2022). A molecular switch controls the impact of cholesterol on a Kir channel. *Proc Natl Acad Sci U S A, 119*(13), e2109431119. doi:10.1073/pnas.2109431119
35. Cui, H., Wang, Q., **Miller, D. D.**, & Li, W. (2021). The Tubulin Inhibitor VERU-111 in Combination With Vemurafenib Provides an Effective Treatment of Vemurafenib-Resistant A375 Melanoma. *Front Pharmacol, 12*, 637098. doi:10.3389/fphar.2021.637098
36. de Jong, T. V., Kim, P., Guryev, V., **Mulligan, M. K.**, **Williams, R. W.**, Redei, E. E., & **Chen, H.** (2021). Whole genome sequencing of nearly isogenic WMI and WLI inbred rats identifies genes potentially involved in depression and stress reactivity. *Sci Rep, 11*(1), 14774. doi:10.1038/s41598-021-92993-4
37. Deng, T., Li, J., Liu, J., Xu, F., Liu, X., Mi, J., Bergquist, J., Wang, H., Yang, C., **Lu, L.**, Song, X., Yao, C., Tian, G., & Zheng, Q. Y. (2021). Hippocampal Transcriptome-Wide Association Study Reveals Correlations Between Impaired Glutamatergic Synapse Pathway and Age-Related Hearing Loss in BXD-Recombinant Inbred Mice. *Front Neurosci, 15*, 745668. doi:10.3389/fnins.2021.745668
38. Devlin, P., **Ishrat, T.**, & **Stanfill, A. G.** (2022). A Systematic Review of Inflammatory Cytokine Changes Following Aneurysmal Subarachnoid Hemorrhage in Animal Models and Humans. *Transl Stroke Res*. doi:10.1007/s12975-022-01001-y
39. **Dietrich, P.**, Alli, S., **Mulligan, M. K.**, Cox, R., Ashbrook, D. G., **Williams, R. W.**, & **Dragatsis, I.** (2022). Identification of cyclin D1 as a major modulator of 3-nitropropionic acid-induced striatal neurodegeneration. *Neurobiol Dis, 162*, 105581. doi:10.1016/j.nbd.2021.105581
40. Diouf, B., Wing, C., Panetta, J. C., Eddins, D., Lin, W., Yang, W., Fan, Y., Pei, D., Cheng, C., Delaney, S. M., Zhang, W., Bonten, E. J., Crews, K. R., Paugh, S. W., Li, L., Freeman, B. B., 3rd, Autry, R. J., Beard, J. A., Ferguson, D. C., Janke, L. J., Ness, K. K., Chen, T., **Zakharenko, S. S.**, Jeha, S., Pui, C. H., Relling, M. V., Eileen Dolan, M., & Evans, W. E. (2021). Identification of small molecules that mitigate vincristine-induced neurotoxicity while sensitizing leukemia cells to vincristine. *Clin Transl Sci, 14*(4), 1490-1504. doi:10.1111/cts.13012
41. Edmonston, D. Y., Wu, S., Li, Y., Khan, R. B., **Boop, F. A.**, & Merchant, T. E. (2022). Limited Surgery and Conformal Photon Radiation Therapy for Pediatric Craniopharyngioma: Long-term Results from the RT1 Protocol. *Neuro Oncol*. doi:10.1093/neuonc/noac124
42. Elliott, K. L., Pavlinkova, G., **Chizhikov, V. V.**, Yamoah, E. N., & Fritzsch, B. (2021). Neurog1, Neurod1, and Atoh1 are essential for spiral ganglia, cochlear nuclei, and cochlear hair cell development. *Fac Rev, 10*, 47. doi:10.12703/r/10-47
43. Elliott, T., Ridley-Pryor, T., Gienapp, A. J., & **Wheless, J. W.** (2022). Initial Real-World Experience With Cenobamate in Adolescents and Adults: A Single Center Experience. *Pediatr Neurol, 129*, 19-23. doi:10.1016/j.pediatrneurol.2022.01.001
44. Elshaer, S. L., Bahram, S. H., Rajashekar, P., **Gangaraju, R.**, & El-Remessy, A. B. (2021). Modulation of Mesenchymal Stem Cells for Enhanced Therapeutic Utility in Ischemic Vascular Diseases. *Int J Mol Sci, 23*(1). doi:10.3390/ijms23010249
45. Erickson, A., Zhou, S., Luo, J., Li, L., Huang, X., Even, Z., Huang, H., Xu, H. M., Peng, J., **Lu, L.**, & Wang, X. (2021). Genetic architecture of protein expression and its regulation in the mouse brain. *BMC Genomics, 22*(1), 875. doi:10.1186/s12864-021-08168-y

46. Even, A., Morelli, G., Turchetto, S., Shilian, M., Bail, R. L., Laguesse, S., Krusy, N., Brisker, A., Brandis, A., Inbar, S., Chariot, A., Saudou, F., **Dietrich, P.**, **Dragatsis, I.**, Brone, B., Broix, L., Rigo, J. M., Weil, M., & Nguyen, L. (2021). Publisher Correction: ATP-citrate lyase promotes axonal transport across species. *Nat Commun, 12*(1), 6678. doi:10.1038/s41467-021-26998-y
47. Even, A., Morelli, G., Turchetto, S., Shilian, M., Bail, R. L., Laguesse, S., Krusy, N., Brisker, A., Brandis, A., Inbar, S., Chariot, A., Saudou, F., **Dietrich, P.**, **Dragatsis, I.**, Brone, B., Broix, L., Rigo, J. M., Weil, M., & Nguyen, L. (2021). ATP-citrate lyase promotes axonal transport across species. *Nat Commun, 12*(1), 5878. doi:10.1038/s41467-021-25786-y
48. Fedinec, A. L., Liu, J., Zhang, R., Harsono, M., **Pourcyrous, M.**, & **Parfenova, H.** (2021). The cold receptor TRPM8 activation leads to attenuation of endothelium-dependent cerebral vascular functions during head cooling. *J Cereb Blood Flow Metab, 41*(11), 2897-2906. doi:10.1177/0271678X211018035
49. Fu, H., Wang, J., Wang, J., Liu, L., **Jiang, J.**, & Hao, J. (2022). 4R-cembranoid protects neuronal cells from oxygen-glucose deprivation by modulating microglial cell activation. *Brain Res Bull, 179*, 74-82. doi:10.1016/j.brainresbull.2021.12.007
50. Galor, A., Sanchez, V., Jensen, A., Burton, M., Maus, K., Stephenson, D., Chalfant, C., & **Mandal, N.** (2022). Meibum sphingolipid composition is altered in individuals with meibomian gland dysfunction-a side by side comparison of Meibum and Tear Sphingolipids. *Ocul Surf, 23*, 87-95. doi:10.1016/j.jtos.2021.11.011
51. Garrud, T. A. C., & **Jaggar, J. H.** (2022). STIMulating blood pressure. *Elife, 11*. doi:10.7554/eLife.77978
52. Ghazwani, Y., Patay, Z., Sadighi, Z. S., Sparrow, J., Upadhyaya, S., **Boop, F.**, Gajjar, A., & Qaddoumi, I. (2021). Handedness switching as a presenting sign for pediatric low-grade gliomas: An insight into brain plasticity from a short case series. *J Pediatr Rehabil Med, 14*(1), 31-36. doi:10.3233/PRM-190637
53. Gibbs, S. K., Fulton, S., Mudigoudar, B., **Boop, F. A.**, & **Narayana, S.** (2021). Presurgical language mapping in bilingual children using transcranial magnetic stimulation: illustrative case. *J Neurosurg Case Lessons, 2*(14). doi:10.3171/CASE21391
54. Goldberg, L. R., Yao, E. J., Kelliher, J. C., Reed, E. R., Wu Cox, J., Parks, C., Kirkpatrick, S. L., Beierle, J. A., Chen, M. M., Johnson, W. E., Homanics, G. E., **Williams, R. W.**, Bryant, C. D., & **Mulligan, M. K.** (2021). A quantitative trait variant in Gabra2 underlies increased methamphetamine stimulant sensitivity. *Genes Brain Behav, 20*(8), e12774. doi:10.1111/gbb.12774
55. Gray, A. L. H., Sawaya, M. R., Acharyya, D., Lou, J., Edington, E. M., Best, M. D., **Prosser, R. A.**, Eisenberg, D. S., & Do, T. D. (2022). Atomic view of an amyloid dodecamer exhibiting selective cellular toxic vulnerability in acute brain slices. *Protein Sci, 31*(3), 716-727. doi:10.1002/pro.4268
56. Gu, Q., Xu, F., Orgil, B. O., Khuchua, Z., Munkhsaikhan, U., Johnson, J. N., Alberson, N. R., Pierre, J. F., Black, D. D., Dong, D., Brennan, J. A., Cathey, B. M., Efimov, I. R., Towbin, J. A., Purevjav, E., & **Lu, L.** (2022). Systems genetics analysis defines importance of TMEM43/LUMA for cardiac- and metabolic-related pathways. *Physiol Genomics, 54*(1), 22-35. doi:10.1152/physiolgenomics.00066.2021
57. Guden, D. S., Temiz-Resitoglu, M., Senol, S. P., Kibar, D., Yilmaz, S. N., Tunctan, B., **Malik, K. U.**, & Sahan-Firat, S. (2021). mTOR inhibition as a possible pharmacological target in the management of systemic inflammatory response and associated neuroinflammation by lipopolysaccharide challenge in rats. *Can J Physiol Pharmacol, 99*(9), 921-934. doi:10.1139/cjpp-2020-0487
58. Gunturkun, M. H., Flashner, E., Wang, T., **Mulligan, M. K.**, **Williams, R. W.**, Prins, P., & **Chen, H.** (2022). GeneCup: mining PubMed and GWAS catalog for gene-keyword relationships. *G3 (Bethesda), 12*(5). doi:10.1093/g3journal/jkac059
59. Hama, T., Nagesh, P. K., Chowdhury, P., **Moore, B. M.**, 2nd, Yallapu, M. M., Regner, K. R., & Park, F. (2021). DNA damage is overcome by TRIP13 overexpression during cisplatin nephrotoxicity. *JCI Insight, 6*(22). doi:10.1172/jci.insight.139092
60. Hawkins, N. A., Nomura, T., Duarte, S., Barse, L., **Williams, R. W.**, Homanics, G. E., **Mulligan, M. K.**, Contractor, A., & Kearney, J. A. (2021). Gabra2 is a genetic modifier of Dravet syndrome in mice. *Mamm Genome, 32*(5), 350-363. doi:10.1007/s00335-021-09877-1
61. He, Y., Hwang, D. J., Ponnusamy, S., Thiyagarajan, T., Mohler, M. L., Narayanan, R., & **Miller, D. D.** (2021). Exploration and Biological Evaluation of Basic Heteromonocyclic Propanamide Derivatives as

SARDs for the Treatment of Enzalutamide-Resistant Prostate Cancer. *J Med Chem, 64*(15), 11045-11062. doi:10.1021/acs.jmedchem.1c00439

62. He, Y., Yang, C., Wang, Y., Sacher, J. R., Sims, M. M., Pfeffer, L. M., & **Miller, D. D.** (2022). Novel structural-related analogs of PFI-3 (SRAPs) that target the BRG1 catalytic subunit of the SWI/SNF complex increase the activity of temozolomide in glioblastoma cells. *Bioorg Med Chem, 53*, 116533. doi:10.1016/j.bmc.2021.116533
63. Hitzemann, R., Bergeson, S. E., Berman, A. E., Bubier, J. A., Chesler, E. J., Finn, D. A., Hein, M., Hoffman, P., Holmes, A., Kisby, B. R., Lockwood, D., Lodowski, K. H., McManus, M., Owen, J. A., Ozburn, A. R., Panthagani, P., Ponomarev, I., Saba, L., Tabakoff, B., Walchale, A., **Williams, R. W.**, & Phillips, T. J. (2022). Sex Differences in the Brain Transcriptome Related to Alcohol Effects and Alcohol Use Disorder. *Biol Psychiatry, 91*(1), 43-52. doi:10.1016/j.biopsych.2021.04.016
64. **Hollingsworth, T. J.**, Hubbard, M. G., Levi, H. J., White, W., Wang, X., Simpson, R., **Jablonski, M. M.**, & Gross, A. K. (2021). Proinflammatory Pathways Are Activated in the Human Q344X Rhodopsin Knock-In Mouse Model of Retinitis Pigmentosa. *Biomolecules, 11*(8). doi:10.3390/biom11081163
65. **Hollingsworth, T. J.**, Wang, X., White, W. A., Simpson, R. N., & **Jablonski, M. M.** (2022). Chronic Proinflammatory Signaling Accelerates the Rate of Degeneration in a Spontaneous Polygenic Model of Inherited Retinal Dystrophy. *Front Pharmacol, 13*, 839424. doi:10.3389/fphar.2022.839424
66. **Honig, M. G.**, Del Mar, N. A., Henderson, D. L., O'Neal, D., Doty, J. B., Cox, R., Li, C., Perry, A. M., **Moore, B. M.**, & **Reiner, A.** (2021). Raloxifene Modulates Microglia and Rescues Visual Deficits and Pathology After Impact Traumatic Brain Injury. *Front Neurosci, 15*, 701317. doi:10.3389/fnins.2021.701317
67. **Honig, M. G.**, Del Mar, N. A., Henderson, D. L., O'Neal, D., Yammanur, M., Cox, R., Li, C., Perry, A. M., **Moore, B. M.**, & Reiner, A. (2022). Raloxifene, a cannabinoid type-2 receptor inverse agonist, mitigates visual deficits and pathology and modulates microglia after ocular blast. *Exp Eye Res, 218*, 108966. doi:10.1016/j.exer.2022.108966
68. **Honig, M. G.**, Dorian, C. C., Worthen, J. D., Micetich, A. C., Mulder, I. A., Sanchez, K. B., Pierce, W. F., Del Mar, N. A., & **Reiner, A.** (2021). Progressive long-term spatial memory loss following repeat concussive and subconcussive brain injury in mice, associated with dorsal hippocampal neuron loss, microglial phenotype shift, and vascular abnormalities. *Eur J Neurosci, 54*(5), 5844-5879. doi:10.1111/ejn.14711
69. Honnell, V., Norrie, J. L., Patel, A. G., Ramirez, C., Zhang, J., Lai, Y. H., Wan, S., & **Dyer, M. A.** (2022). Identification of a modular super-enhancer in murine retinal development. *Nat Commun, 13*(1), 253. doi:10.1038/s41467-021-27924-y
70. Hossain Saad, M. Z., Xiang, L., Liao, Y. S., Reznikov, L. R., & **Du, J.** (2021). The Underlying Mechanism of Modulation of Transient Receptor Potential Melastatin 3 by protons. *Front Pharmacol, 12*, 632711. doi:10.3389/fphar.2021.632711
71. Hou, R., Yu, Y., Sluter, M. N., Li, L., Hao, J., Fang, J., Yang, J., & **Jiang, J.** (2022). Targeting EP2 receptor with multifaceted mechanisms for high-risk neuroblastoma. *Cell Rep, 39*(12), 111000. doi:10.1016/j.celrep.2022.111000
72. Howe, K., Dwinell, M., Shimoyama, M., Corton, C., Betteridge, E., Dove, A., Quail, M. A., Smith, M., Saba, L., **Williams, R. W.**, **Chen, H.**, Kwitek, A. E., McCarthy, S. A., Uliano-Silva, M., Chow, W., Tracey, A., Torrance, J., Sims, Y., Challis, R., Threlfall, J., & Blaxter, M. (2021). The genome sequence of the Norway rat, Rattus norvegicus Berkenhout 1769. *Wellcome Open Res, 6*, 118. doi:10.12688/wellcomeopenres.16854.1
73. Hu, H., Mosca, R., Gomero, E., van de Vlekkert, D., Campos, Y., Fremuth, L. E., Brown, S. A., Weesner, J. A., Annunziata, I., & **d'Azzo, A.** (2021). AAV-mediated gene therapy for galactosialidosis: A long-term safety and efficacy study. *Mol Ther Methods Clin Dev, 23*, 644-658. doi:10.1016/j.omtm.2021.10.007
74. Huang, X., Sun, J., Majoor, J., Vermeer, K. A., Lemij, H., Elze, T., Wang, M., Boland, M. V., Pasquale, L. R., Mohammadzadeh, V., Nouri-Mahdavi, K., Johnson, C., & **Yousefi, S.** (2021). Estimating the Severity of Visual Field Damage From Retinal Nerve Fiber Layer Thickness Measurements With Artificial Intelligence. *Transl Vis Sci Technol, 10*(9), 16. doi:10.1167/tvst.10.9.16

75. Ismael, S., Mirzahosseini, G., Ahmed, H. A., Yoo, A., Kassan, M., **Malik, K. U.**, & **Ishrat, T.** (2021). Renin-Angiotensin System Alterations in the Human Alzheimer's Disease Brain. *J Alzheimers Dis, 84*(4), 1473-1484. doi:10.3233/JAD-215051
76. Ismael, S., Nasoohi, S., Li, L., Aslam, K. S., **Khan, M. M.**, El-Remessy, A. B., **McDonald, M. P.**, Liao, F. F., & **Ishrat, T.** (2021). Thioredoxin interacting protein regulates age-associated neuroinflammation. *Neurobiol Dis, 156*, 105399. doi:10.1016/j.nbd.2021.105399
77. Ismael, S., Nasoohi, S., Yoo, A., Mirzahosseini, G., Ahmed, H. A., & **Ishrat, T.** (2021). Verapamil as an Adjunct Therapy to Reduce tPA Toxicity in Hyperglycemic Stroke: Implication of TXNIP/NLRP3 Inflammasome. *Mol Neurobiol, 58*(8), 3792-3804. doi:10.1007/s12035-021-02384-z
78. Ismael, S., Wajidunnisa, **Sakata, K.**, **McDonald, M. P.**, Liao, F. F., & **Ishrat, T.** (2021). ER stress associated TXNIP-NLRP3 inflammasome activation in hippocampus of human Alzheimer's disease. *Neurochem Int, 148*, 105104. doi:10.1016/j.neuint.2021.105104
79. Iversen, W. L., **Cowan, R. L.**, Atalla, S., Englehart, S. S., Gure, T. R., Moss, K. O., Ryan, C. M., Scharre, D. W., Wright, K. D., & Monroe, T. B. (2022). Treating the most vulnerable: A discursive review of experimental pain in Alzheimer's disease. *Nurs Open, 9*(2), 942-949. doi:10.1002/nop2.922
80. Iversen, W. L., Monroe, T. B., Atalla, S., Anderson, A. R., **Cowan, R. L.**, Wright, K. D., Failla, M. D., & Moss, K. O. (2022). Promoting successful participation of people living with Alzheimer's disease and related dementias in pain-related neuroimaging research studies. *Front Pain Res (Lausanne), 3*, 926459. doi:10.3389/fpain.2022.926459
81. Jha, K. A., Rasiah, P. K., Gentry, J., Del Mar, N. A., Kumar, R., Adebiyi, A., **Reiner, A.**, & **Gangaraju, R.** (2022). Mesenchymal stem cell secretome protects against oxidative stress-induced ocular blast visual pathologies. *Exp Eye Res, 215*, 108930. doi:10.1016/j.exer.2022.108930
82. Jiang, Y., Patton, M. H., & **Zakharenko, S. S.** (2021). A Case for Thalamic Mechanisms of Schizophrenia: Perspective From Modeling 22q11.2 Deletion Syndrome. *Front Neural Circuits, 15*, 769969. doi:10.3389/fncir.2021.769969
83. **Jones, B. C.**, Erikson, K. M., **Mulligan, M. K.**, Torres-Rojas, C., Zhao, W., Zhuang, D., **Lu, L.**, & **Williams, R. W.** (2021). Genetic differences in ethanol consumption: effects on iron, copper, and zinc regulation in mouse hippocampus. *Biometals, 34*(5), 1059-1066. doi:10.1007/s10534-021-00327-8
84. Juuri, E., Tikka, P., Domanskyi, A., Corfe, I., Morita, W., **McKinnon, P. J.**, Jandova, N., & Balic, A. (2022). Ptch2 is a Potential Regulator of Mesenchymal Stem Cells. *Front Physiol, 13*, 877565. doi:10.3389/fphys.2022.877565
85. Kallumadyil, A. M. T., McClenahan, T., De Filippis, S., Vungarala, A., Satyadev, N., **Waters, R. S.**, & Kulkarni, A. L. (2021). Perspectives into the possible effects of the B.1.1.7 variant of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) on spermatogenesis. *J Basic Clin Physiol Pharmacol, 33*(1), 9-12. doi:10.1515/jbcpp-2021-0083
86. Khan, R. B., Patay, Z., Klimo, P., Huang, J., Kumar, R., **Boop, F. A.**, Raches, D., Conklin, H. M., Sharma, R., Simmons, A., Sadighi, Z. S., Onar-Thomas, A., Gajjar, A., & Robinson, G. W. (2021). Clinical features, neurologic recovery, and risk factors of postoperative posterior fossa syndrome and delayed recovery: a prospective study. *Neuro Oncol, 23*(9), 1586-1596. doi:10.1093/neuonc/noab030
87. Khom, S., Rodriguez, L., Gandhi, P., **Kirson, D.**, Bajo, M., Oleata, C. S., Vendruscolo, L. F., Mason, B. J., & Roberto, M. (2022). Alcohol dependence and withdrawal increase sensitivity of central amygdalar GABAergic synapses to the glucocorticoid receptor antagonist mifepristone in male rats. *Neurobiol Dis, 164*, 105610. doi:10.1016/j.nbd.2022.105610
88. Kim, S., Kim, Y. E., Song, I., Ujihara, Y., Kim, N., Jiang, Y. H., Yin, H. H., Lee, T. H., & **Kim, I. H.** (2022). Neural circuit pathology driven by Shank3 mutation disrupts social behaviors. *Cell Rep, 39*(10), 110906. doi:10.1016/j.celrep.2022.110906
89. Kiran, S., Rakib, A., **Moore, B. M.**, & Singh, U. P. (2022). Cannabinoid Receptor 2 (CB2) Inverse Agonist SMM-189 Induces Expression of Endogenous CB2 and Protein Kinase A That Differentially Modulates the Immune Response and Suppresses Experimental Colitis. *Pharmaceutics, 14*(5). doi:10.3390/pharmaceutics14050936
90. **Kirson, D.**, Spierling Bagsic, S. R., Murphy, J., Chang, H., Vlkolinsky, R., Pucci, S. N., Prinzi, J., Williams, C. A., Fang, S. Y., Roberto, M., & Zorrilla, E. P. (2022). Decreased excitability of leptin-

sensitive anterior insula pyramidal neurons in a rat model of compulsive food demand. *Neuropharmacology, 208*, 108980. doi:10.1016/j.neuropharm.2022.108980

91. Kodali, M. C., **Chen, H.**, & Liao, F. F. (2021). Temporal unsnarling of brain's acute neuroinflammatory transcriptional profiles reveals panendothelitis as the earliest event preceding microgliosis. *Mol Psychiatry, 26*(8), 3905-3919. doi:10.1038/s41380-020-00955-5
92. Koffman, E. E., Kruse, C. M., Singh, K., Naghavi, F. S., Curtis, M. A., Egbo, J., Houdi, M., Lin, B., Lu, H., Debiec, J., & **Du, J.** (2022). Acid-sensing ion channel 1a regulates the specificity of reconsolidation of conditioned threat responses. *JCI Insight, 7*(4). doi:10.1172/jci.insight.155341
93. Kozyrev, D. A., Soleman, J., Tsering, D., Keating, R. F., Hersh, D. S., **Boop, F. A.**, Spennato, P., Cinalli, G., Tamburrini, G., Thomale, U. W., Bollo, R. J., Chatterjee, S., Lalgudi Srinivasan, H., Constantini, S., & Roth, J. (2021). Pediatric thalamic incidentalomas: an international retrospective multicenter study. *J Neurosurg Pediatr*, 1-9. doi:10.3171/2021.6.PEDS20976
94. Kwak, Y. D., Shaw, T. I., Downing, S. M., Tewari, A., Jin, H., Li, Y., Dumitrache, L. C., Katyal, S., Khodakhah, K., Russell, H. R., & **McKinnon, P. J.** (2021). Chromatin architecture at susceptible gene loci in cerebellar Purkinje cells characterizes DNA damage-induced neurodegeneration. *Sci Adv, 7*(51), eabg6363. doi:10.1126/sciadv.abg6363
95. Lane, A. R., Cogdell, I. C., Jessell, T. M., **Bikoff, J.** B., & Alvarez, F. J. (2021). Genetic targeting of adult Renshaw cells using a Calbindin 1 destabilized Cre allele for intersection with Parvalbumin or Engrailed1. *Sci Rep, 11*(1), 19861. doi:10.1038/s41598-021-99333-6
96. Li, H., Ibrahim, M. M., **Chen, H.**, Li, W., & **Jablonski, M. M.** (2021). In Silico Screening and In Vivo Evaluation of Potential CACNA2D1 Antagonists as Intraocular Pressure-Reducing Agents in Glaucoma Therapy. *Pharmaceuticals (Basel), 14*(9). doi:10.3390/ph14090887
97. Li, K., Shen, Y., Miller, M. A., Stabenow, J., **Williams, R. W.**, & **Lu, L.** (2021). Differing susceptibility of C57BL/6J and DBA/2J mice-parents of the murine BXD family, to severe acute respiratory syndrome coronavirus infection. *Cell Biosci, 11*(1), 137. doi:10.1186/s13578-021-00656-8
98. Li, L., Yasmen, N., Hou, R., Yang, S., Lee, J. Y., Hao, J., Yu, Y., & **Jiang, J.** (2022). Inducible Prostaglandin E Synthase as a Pharmacological Target for Ischemic Stroke. *Neurotherapeutics, 19*(1), 366-385. doi:10.1007/s13311-022-01191-1
99. Liao, F. F., Lin, G., Chen, X., Chen, L., Zheng, W., Raghow, R., **Zhou, F. M.**, Shih, A. Y., & Tan, X. L. (2021). Endothelial Nitric Oxide Synthase-Deficient Mice: A Model of Spontaneous Cerebral Small-Vessel Disease. *Am J Pathol, 191*(11), 1932-1945. doi:10.1016/j.ajpath.2021.02.022
100. Liu, A. P. Y., Wu, G., Orr, B. A., Lin, T., Ashford, J. M., Bass, J. K., Bowers, D. C., Hassall, T., Fisher, P. G., Indelicato, D. J., Klimo, P., Jr., **Boop, F.**, Conklin, H., Onar-Thomas, A., Merchant, T. E., Ellison, D. W., Gajjar, A., & Robinson, G. W. (2021). Outcome and molecular analysis of young children with choroid plexus carcinoma treated with non-myeloablative therapy: results from the SJYC07 trial. *Neurooncol Adv, 3*(1), vdaa168. doi:10.1093/noajnl/vdaa168
101. Lucas, J. T., Jr., Faught, A. M., Hsu, C. Y., Wilson, L. J., Guo, Y., Li, Y., Khan, R., Becksfort, J. B., LeVine, D. A., Ismael, Y., Darrow, K., Moskvin, V. P., Pirlepesov, F., Klimo, P., Elijovich, L., Indelicato, D. J., **Boop, F. A.**, & Merchant, T. E. (2022). Pre- and Posttherapy Risk Factors for Vasculopathy in Pediatric Patients With Craniopharyngioma Treated With Surgery and Proton Radiation Therapy. *Int J Radiat Oncol Biol Phys, 113*(1), 152-160. doi:10.1016/j.ijrobp.2021.12.172
102. Lukka, P. B., Woods, M., Chhim, R., Phelps, S. J., **Wheless, J. W.**, & Meibohm, B. (2021). Use of Real-World Data and Pharmacometric Modeling in Support of Lacosamide Dosing in Pediatric Patients Under 4 Years of Age. *J Clin Pharmacol, 61*(7), 881-888. doi:10.1002/jcph.1840
103. Machado, E. R., Annunziata, I., van de Vlekkert, D., Grosveld, G. C., & **d'Azzo, A.** (2021). Lysosomes and Cancer Progression: A Malignant Liaison. *Front Cell Dev Biol, 9*, 642494. doi:10.3389/fcell.2021.642494
104. MacKay, C. E., Floen, M., Leo, M. D., Hasan, R., Garrud, T. A. C., Fernandez-Pena, C., Singh, P., **Malik, K. U.**, & **Jaggar, J. H.** (2022). A plasma membrane-localized polycystin-1/polycystin-2 complex in endothelial cells elicits vasodilation. *Elife, 11*. doi:10.7554/eLife.74765
105. Madangopal, R., Ramsey, L. A., Weber, S. J., Brenner, M. B., Lennon, V. A., Drake, O. R., Komer, L. E., **Tunstall, B. J.**, Bossert, J. M., Shaham, Y., & Hope, B. T. (2021). Inactivation of the infralimbic cortex

decreases discriminative stimulus-controlled relapse to cocaine seeking in rats. *Neuropsychopharmacology, 46*(11), 1969-1980. doi:10.1038/s41386-021-01067-6

106. Mangham, W. M., Elijovich, L., Lee-Diaz, J. A., Orr, B. A., Gienapp, A. J., & **Boop, F. A.** (2022). Pre-operative embolization for staged treatment of infantile choroid plexus papilloma. *Childs Nerv Syst, 38*(2), 429-433. doi:10.1007/s00381-021-05212-w
107. McAfee, S. S., Liu, Y., Sillitoe, R. V., & **Heck, D. H.** (2021). Cerebellar Coordination of Neuronal Communication in Cerebral Cortex. *Front Syst Neurosci, 15*, 781527. doi:10.3389/fnsys.2021.781527
108. Meena, A. S., Shukla, P. K., Bell, B., Giorgianni, F., Caires, R., Fernandez-Pena, C., Beranova, S., Aihara, E., Montrose, M. H., Chaib, M., Makowski, L., Neeli, I., Radic, M. Z., **Vasquez, V.**, **Jaggar, J. H.**, Cordero-Morales, J. F., & Rao, R. (2022). TRPV6 channel mediates alcohol-induced gut barrier dysfunction and systemic response. *Cell Rep, 39*(11), 110937. doi:10.1016/j.celrep.2022.110937
109. Merchant, T. E., Edmonston, D. Y., Wu, S., Li, Y., **Boop, F. A.**, & Lustig, R. H. (2022). Endocrine Outcomes after Limited Surgery and Conformal Photon Radiation Therapy for Pediatric Craniopharyngioma: Long-term Results from the RT1 Protocol. *Neuro Oncol*. doi:10.1093/neuonc/noac115
110. Miller, I., **Wheless, J. W.**, Hogan, R. E., Dlugos, D., Biton, V., Cascino, G. D., Sperling, M. R., Liow, K., Vazquez, B., Segal, E. B., Tarquinio, D., Mauney, W., Desai, J., Rabinowicz, A. L., Carrazana, E., & Group, D. S. (2021). Consistent safety and tolerability of Valtoco((R)) (diazepam nasal spray) in relationship to usage frequency in patients with seizure clusters: Interim results from a phase 3, long-term, open-label, repeat-dose safety study. *Epilepsia Open, 6*(3), 504-512. doi:10.1002/epi4.12494
111. Millet, J. R. M., Romero, L. O., Lee, J., Bell, B., & **Vasquez, V.** (2022). C. elegans PEZO-1 is a mechanosensitive ion channel involved in food sensation. *J Gen Physiol, 154*(1). doi:10.1085/jgp.202112960
112. Mirzahosseini, G., Adam, J. M., Nasoohi, S., El-Remessy, A. B., & **Ishrat, T.** (2022). Lost in Translation: Neurotrophins Biology and Function in the Neurovascular Unit. *Neuroscientist*, 10738584221104982. doi:10.1177/10738584221104982
113. Mirzahosseini, G., Ismael, S., Ahmed, H. A., & **Ishrat, T.** (2021). Manifestation of renin angiotensin system modulation in traumatic brain injury. *Metab Brain Dis, 36*(6), 1079-1086. doi:10.1007/s11011-021-00728-1
114. Mohamed, I. N., Li, L., Ismael, S., **Ishrat, T.**, & El-Remessy, A. B. (2021). Thioredoxin interacting protein, a key molecular switch between oxidative stress and sterile inflammation in cellular response. *World J Diabetes, 12*(12), 1979-1999. doi:10.4239/wjd.v12.i12.1979
115. Mondal, K., Porter, H., Cole, J., 2nd, Pandya, H. K., Basu, S. K., Khanam, S., Chiu, C. Y., Shah, V., Stephenson, D. J., Chalfant, C. E., & **Mandal, N.** (2022). Hydroxychloroquine Causes Early Inner Retinal Toxicity and Affects Autophagosome-Lysosomal Pathway and Sphingolipid Metabolism in the Retina. *Mol Neurobiol, 59*(6), 3873-3887. doi:10.1007/s12035-022-02825-3
116. Mondal, K., Takahashi, H., Cole, J., 2nd, Del Mar, N. A., Li, C., Stephenson, D. J., Allegood, J., Cowart, L. A., Chalfant, C. E., **Reiner, A.**, & **Mandal, N.** (2021). Systemic Elevation of n-3 Polyunsaturated Fatty Acids (n-3-PUFA) Is Associated with Protection against Visual, Motor, and Emotional Deficits in Mice following Closed-Head Mild Traumatic Brain Injury. *Mol Neurobiol, 58*(11), 5564-5580. doi:10.1007/s12035-021-02501-y
117. Moss, K. O., Wright, K. D., Tan, A., Rose, K. M., Scharre, D. W., Gure, T. R., **Cowan, R. L.**, Failla, M. D., & Monroe, T. B. (2021). Race-Related Differences Between and Within Sex to Experimental Thermal Pain in Middle and Older Adulthood: An Exploratory Pilot Analysis. *Front Pain Res (Lausanne), 2*, 780338. doi:10.3389/fpain.2021.780338
118. **Mozhui, K.**, Lu, A. T., Li, C. Z., Haghani, A., Sandoval-Sierra, J. V., Wu, Y., **Williams, R. W.**, & Horvath, S. (2022). Genetic loci and metabolic states associated with murine epigenetic aging. *Elife, 11*. doi:10.7554/eLife.75244
119. Mudigoudar, B., & **Wheless, J. W.** (2022). Sudden Unexpected Death in Epilepsy (SUDEP): How Do We Prevent This Childhood Tragedy? *J Pediatr Pharmacol Ther, 27*(2), 99-101. doi:10.5863/1551-6776-27.2.99

120. Nagib, M. M., Zhang, S., Yasmen, N., Li, L., Hou, R., Yu, Y., Boda, V. K., Wu, Z., Li, W., & **Jiang, J.** (2022). Inhibition of TRPC3 channels by a novel pyrazole compound confers antiseizure effects. *Epilepsia, 63*(4), 1003-1015. doi:10.1111/epi.17190
121. **Narayana, S.**, Franklin, C., Peterson, E., Hunter, E. J., Robin, D. A., Halpern, A., Spielman, J., Fox, P. T., & Ramig, L. O. (2022). Immediate and long-term effects of speech treatment targets and intensive dosage on Parkinson's disease dysphonia and the speech motor network: Randomized controlled trial. *Hum Brain Mapp, 43*(7), 2328-2347. doi:10.1002/hbm.25790
122. **Narayana, S.**, Gibbs, S. K., Fulton, S. P., **McGregor, A. L.**, Mudigoudar, B., Weatherspoon, S. E., **Boop, F. A.**, & **Wheless, J. W.** (2021). Clinical Utility of Transcranial Magnetic Stimulation (TMS) in the Presurgical Evaluation of Motor, Speech, and Language Functions in Young Children With Refractory Epilepsy or Brain Tumor: Preliminary Evidence. *Front Neurol, 12*, 650830. doi:10.3389/fneur.2021.650830
123. Newkirk, G. S., Guan, D., Dembrow, N., **Armstrong, W. E.**, **Foehring, R. C.**, & Spain, W. J. (2022). Kv2.1 Potassium Channels Regulate Repetitive Burst Firing in Extratelencephalic Neocortical Pyramidal Neurons. *Cereb Cortex, 32*(5), 1055-1076. doi:10.1093/cercor/bhab266
124. Nguyen, V. N., Motiwala, M., Ha, L., Boom, A. D., & **Boop, F. A.** (2021). C4-T3 Replacement Laminoplasty and Microsurgical Resection of Ependymoma: 2-Dimensional Operative Video. *Oper Neurosurg (Hagerstown), 21*(4), E359-E360. doi:10.1093/ons/opab241
125. Nicoli, E. R., Annunziata, I., **d'Azzo, A.**, Platt, F. M., Tifft, C. J., & Stepien, K. M. (2021). GM1 Gangliosidosis-A Mini-Review. *Front Genet, 12*, 734878. doi:10.3389/fgene.2021.734878
126. Norrie, J. L., Nityanandam, A., Lai, K., Chen, X., Wilson, M., Stewart, E., Griffiths, L., Jin, H., Wu, G., Orr, B., Tran, Q., Allen, S., Reilly, C., Zhou, X., Zhang, J., Newman, K., Johnson, D., Brennan, R., & **Dyer, M. A.** (2021). Retinoblastoma from human stem cell-derived retinal organoids. *Nat Commun, 12*(1), 4535. doi:10.1038/s41467-021-24781-7
127. North, K. C., Bukiya, A. N., & **Dopico, A. M.** (2021). BK channel-forming slo1 proteins mediate the brain artery constriction evoked by the neurosteroid pregnenolone. *Neuropharmacology, 192*, 108603. doi:10.1016/j.neuropharm.2021.108603
128. North, K. C., Zhang, M., Singh, A. K., Zaytseva, D., Slayden, A. V., Bukiya, A. N., & **Dopico, A. M.** (2022). Cholesterol Inhibition of Slo1 Channels Is Calcium-Dependent and Can Be Mediated by Either High-Affinity Calcium-Sensing Site in the Slo1 Cytosolic Tail. *Mol Pharmacol, 101*(3), 132-143. doi:10.1124/molpharm.121.000392
129. Parikh, K. A., Merchant, T. E., & **Boop, F. A.** (2022). Suboccipital Microsurgical Resection of Pediatric Ependymoma in the Foramen of Luschka: 2-Dimensional Operative Video. *Oper Neurosurg (Hagerstown), 22*(1), e51. doi:10.1227/ONS.0000000000000023
130. Parks, C., Rogers, C. M., Prins, P., **Williams, R. W.**, **Chen, H.**, **Jones, B. C.**, **Moore, B. M.**, 2nd, & **Mulligan, M. K.** (2021). Genetic Modulation of Initial Sensitivity to Delta9-Tetrahydrocannabinol (THC) Among the BXD Family of Mice. *Front Genet, 12*, 659012. doi:10.3389/fgene.2021.659012
131. Penovich, P., **Wheless, J. W.**, Hogan, R. E., Guerra, C., Cook, D. F., Carrazana, E., & Rabinowicz, A. L. (2021). Examining the patient and caregiver experience with diazepam nasal spray for seizure clusters: Results from an exit survey of a phase 3, open-label, repeat-dose safety study. *Epilepsy Behav, 121*(Pt A), 108013. doi:10.1016/j.yebeh.2021.108013
132. Perez, H., Abdallah, M. F., Chavira, J. I., Norris, A. S., Egeland, M. T., Vo, K. L., Buechsenschuetz, C. L., Sanghez, V., Kim, J. L., Pind, M., Nakamura, K., Hicks, G. G., Gatti, R. A., Madrenas, J., Iacovino, M., **McKinnon, P. J.**, & Mathews, P. J. (2021). A novel, ataxic mouse model of ataxia telangiectasia caused by a clinically relevant nonsense mutation. *Elife, 10*. doi:10.7554/eLife.64695
133. Postlethwaite, A. E., Tuckey, R. C., Kim, T. K., Li, W., **Bhattacharya, S. K.**, Myers, L. K., Brand, D. D., & Slominski, A. T. (2021). 20S-Hydroxyvitamin D3, a Secosteroid Produced in Humans, Is Anti-Inflammatory and Inhibits Murine Autoimmune Arthritis. *Front Immunol, 12*, 678487. doi:10.3389/fimmu.2021.678487
134. **Pourcyrous, M.**, Elabiad, M. T., Rana, D., Gaston, K. P., DeBaer, L., & Dhanireddy, R. (2021). Racial differences in opioid withdrawal syndrome among neonates with intrauterine opioid exposure. *Pediatr Res, 90*(2), 459-463. doi:10.1038/s41390-020-01279-4

135. Quintana-Feliciano, R., Gobin, C., Kane, L., Sortman, B., Rakela, S., Genovese, A., **Tunstall, B.**, Caprioli, D., Iniguez, S. D., & Warren, B. L. (2021). Food-Seeking Behavior Is Mediated by Fos-Expressing Neuronal Ensembles Formed at First Learning in Rats. *eNeuro, 8*(2). doi:10.1523/ENEURO.0373-20.2021
136. Rana, D., Garde, K., Elabiad, M. T., & **Pourcyrous, M.** (2022). Whole body massage for newborns: A report on non-invasive methodology for neonatal opioid withdrawal syndrome. *J Neonatal Perinatal Med, 15*(3), 559-565. doi:10.3233/NPM-220989
137. Rana, M., Kansal, R., Chaib, M., Teng, B., Morrrison, M., Hayes, D. N., **Stanfill, A. G.**, Shibata, D., Carson, J. A., Makowski, L., & Glazer, E. S. (2022). The pancreatic cancer immune tumor microenvironment is negatively remodeled by gemcitabine while TGF-beta receptor plus dual checkpoint inhibition maintains antitumor immune cells. *Mol Carcinog, 61*(6), 549-557. doi:10.1002/mc.23401
138. Rasiah, P. K., Geier, B., Jha, K. A., & **Gangaraju, R.** (2021). Visual deficits after traumatic brain injury. *Histol Histopathol, 36*(7), 711-724. doi:10.14670/HH-18-315
139. Romano, R. R., Carter, M. A., Dietrich, M. S., **Cowan, R. L.**, Bruehl, S. P., & Monroe, T. B. (2021). Could Altered Evoked Pain Responsiveness Be a Phenotypic Biomarker for Alzheimer's Disease Risk? A Cross-Sectional Analysis of Cognitively Healthy Individuals. *J Alzheimers Dis, 79*(3), 1227-1233. doi:10.3233/JAD-201293
140. Roy, S., Sleiman, M. B., Jha, P., Ingels, J. F., Chapman, C. J., McCarty, M. S., Ziebarth, J. D., Hook, M., Sun, A., Zhao, W., Huang, J., Neuner, S. M., Wilmott, L. A., Shapaker, T. M., Centeno, A. G., Ashbrook, D. G., **Mulligan, M. K.**, Kaczorowski, C. C., Makowski, L., Cui, Y., Read, R. W., Miller, R. A., **Mozhui, K.**, Williams, E. G., Sen, S., **Lu, L.**, Auwerx, J., & **Williams, R. W.** (2021). Gene-by-environment modulation of lifespan and weight gain in the murine BXD family. *Nat Metab, 3*(9), 1217-1227. doi:10.1038/s42255-021-00449-w
141. Sabin, N. D., Hwang, S. N., Klimo, P., Jr., Chambwe, N., Tatevossian, R. G., Patni, T., Li, Y., **Boop, F. A.**, Anderson, E., Gajjar, A., Merchant, T. E., & Ellison, D. W. (2021). Anatomic Neuroimaging Characteristics of Posterior Fossa Type A Ependymoma Subgroups. *AJNR Am J Neuroradiol, 42*(12), 2245-2250. doi:10.3174/ajnr.A7322
142. Salim, C., Kan, A. K., Batsaikhan, E., Patterson, E. C., & **Jee, C.** (2022). Neuropeptidergic regulation of compulsive ethanol seeking in C. elegans. *Sci Rep, 12*(1), 1804. doi:10.1038/s41598-022-05256-1
143. Salman, M., Ismael, S., Li, L., Ahmed, H. A., Puchowicz, M. A., & **Ishrat, T.** (2021). Endothelial Thioredoxin-Interacting Protein Depletion Reduces Hemorrhagic Transformation in Hyperglycemic Mice after Embolic Stroke and Thrombolytic Therapy. *Pharmaceuticals (Basel), 14*(10). doi:10.3390/ph14100983
144. Salman, M., Ismael, S., Li, L., Ahmed, H. A., Puchowicz, M. A., & **Ishrat, T.** (2022). Acute Hyperglycemia Exacerbates Hemorrhagic Transformation after Embolic Stroke and Reperfusion with tPA: A Possible Role of TXNIP-NLRP3 Inflammasome. *J Stroke Cerebrovasc Dis, 31*(2), 106226. doi:10.1016/j.jstrokecerebrovasdis.2021.106226
145. Sasani, T. A., Ashbrook, D. G., Beichman, A. C., **Lu, L.**, Palmer, A. A., **Williams, R. W.**, Pritchard, J. K., & Harris, K. (2022). A natural mutator allele shapes mutation spectrum variation in mice. *Nature, 605*(7910), 497-502. doi:10.1038/s41586-022-04701-5
146. Schmitt, J. E., DeBevits, J. J., Roalf, D. R., Ruparel, K., Gallagher, R. S., Gur, R. C., Alexander-Bloch, A., Eom, T. Y., Alam, S., Steinberg, J., Akers, W., Khairy, K., Crowley, T. B., Emanuel, B., **Zakharenko, S. S.**, McDonald-McGinn, D. M., & Gur, R. E. (2021). A Comprehensive Analysis of Cerebellar Volumes in the 22q11.2 Deletion Syndrome. *Biol Psychiatry Cogn Neurosci Neuroimaging*. doi:10.1016/j.bpsc.2021.11.008
147. Segal, E., Moretz, K., **Wheless, J.**, Penovich, P., Lancman, M., Patten, A., & Malhotra, M. (2022). PROVE-Phase IV Study of Perampanel in Real-World Clinical Care of Patients with Epilepsy: Interim Analysis in Pediatric Patients. *J Child Neurol, 37*(4), 256-267. doi:10.1177/08830738211047665
148. Segal, E., **Wheless, J.**, Moretz, K., Penovich, P., Patten, A., & Malhotra, M. (2022). Perampanel in real-world clinical care of adolescent and adult patients with epilepsy: Results from the retrospective Phase IV PROVE Study. *Seizure, 98*, 87-94. doi:10.1016/j.seizure.2022.02.011
149. Senko, A. N., Overall, R. W., Silhavy, J., Mlejnek, P., Malinska, H., Huttl, M., Markova, I., Fabel, K. S., **Lu, L.**, Stuchlik, A., **Williams, R. W.**, Pravenec, M., & Kempermann, G. (2022). Systems genetics in the

rat HXB/BXH family identifies Tti2 as a pleiotropic quantitative trait gene for adult hippocampal neurogenesis and serum glucose. *PLoS Genet, 18*(4), e1009638. doi:10.1371/journal.pgen.1009638

150. Sevilis, T., **McDonald, M.**, Avila, A., Heath, G., Gao, L., O'Brien, G., Zaman, M., Heller, A., Masud, M., Mowzoon, N., & Devlin, T. (2022). Telestroke: Maintaining Quality Acute Stroke Care During the COVID-19 Pandemic. *Telemed J E Health, 28*(4), 481-485. doi:10.1089/tmj.2021.0149
151. **Sharp, B. M.**, Fan, X., Redei, E. E., **Mulligan, M. K.**, & **Chen, H.** (2021). Sex and heredity are determinants of drug intake in a novel model of rat oral oxycodone self-administration. *Genes Brain Behav, 20*(8), e12770. doi:10.1111/gbb.12770
152. Shrestha, A. P., & **Vaithianathan, T.** (2022). Tracking the dynamics of single fused synaptic vesicle proteins from a single ribbon active zone in zebrafish retinal bipolar cells. *STAR Protoc, 3*(1), 101107. doi:10.1016/j.xpro.2021.101107
153. Siddiqui, A., **McGregor, A. L.**, **Wheless, J. W.**, Klimo, P., **Boop, F. A.**, & Khan, R. B. (2021). Utility of Epilepsy Surgery in Survivors of Childhood Cancer. *Neuropediatrics, 52*(6), 480-483. doi:10.1055/s-0041-1728653
154. Simon, M. V., Basu, S. K., Qaladize, B., Grambergs, R., Rotstein, N. P., & **Mandal, N.** (2021). Sphingolipids as critical players in retinal physiology and pathology. *J Lipid Res, 62*, 100037. doi:10.1194/jlr.TR120000972
155. Singh, P., Song, C. Y., Dutta, S. R., Pingili, A., Shin, J. S., Gonzalez, F. J., Bonventre, J. V., & **Malik, K. U.** (2021). 6beta-Hydroxytestosterone Promotes Angiotensin II-Induced Hypertension via Enhanced Cytosolic Phospholipase A2alpha Activity. *Hypertension, 78*(4), 1053-1066. doi:10.1161/HYPERTENSIONAHA.121.17927
156. Sluter, M. N., Hou, R., Li, L., Yasmen, N., Yu, Y., Liu, J., & **Jiang, J.** (2021). EP2 Antagonists (2011-2021): A Decade's Journey from Discovery to Therapeutics. *J Med Chem, 64*(16), 11816-11836. doi:10.1021/acs.jmedchem.1c00816
157. Song, C. Y., Singh, P., Motiwala, M., Shin, J. S., Lew, J., Dutta, S. R., Gonzalez, F. J., Bonventre, J. V., & **Malik, K. U.** (2021). 2-Methoxyestradiol Ameliorates Angiotensin II-Induced Hypertension by Inhibiting Cytosolic Phospholipase A2alpha Activity in Female Mice. *Hypertension, 78*(5), 1368-1381. doi:10.1161/HYPERTENSIONAHA.121.18181
158. Sperling, M. R., **Wheless, J. W.**, Hogan, R. E., Dlugos, D., Cascino, G. D., Liow, K., Rabinowicz, A. L., Carrazana, E., & Group, D. S. (2022). Use of second doses of Valtoco(R) (diazepam nasal spray) across 24 hours after the initial dose for out-of-hospital seizure clusters: Results from a phase 3, open-label, repeat-dose safety study. *Epilepsia, 63*(4), 836-843. doi:10.1111/epi.17177
159. **Stanfill, A. G.**, & Cao, X. (2021). Enhancing Research Through the Use of the Genotype-Tissue Expression (GTEx) Database. *Biol Res Nurs, 23*(3), 533-540. doi:10.1177/1099800421994186
160. Swanson, M. L., Regner, K. R., **Moore, B. M.**, & Park, F. (2022). Cannabinoid Type 2 Receptor Activation Reduces the Progression of Kidney Fibrosis Using a Mouse Model of Unilateral Ureteral Obstruction. *Cannabis Cannabinoid Res*. doi:10.1089/can.2021.0127
161. Taylor, A. P., Lee, A. S., Goedecke, P. J., Tolley, E. A., Joyner, A. L., & **Heck, D. H.** (2022). Conditional loss of Engrailed1/2 in Atoh1-derived excitatory cerebellar nuclear neurons impairs eupneic respiration in mice. *Genes Brain Behav, 21*(2), e12788. doi:10.1111/gbb.12788
162. Temiz-Resitoglu, M., Guden, D. S., Senol, S. P., Vezir, O., Sucu, N., Kibar, D., Yilmaz, S. N., Tunctan, B., **Malik, K. U.**, & Sahan-Firat, S. (2022). Pharmacological Inhibition of Mammalian Target of Rapamycin Attenuates Deoxycorticosterone Acetate Salt-Induced Hypertension and Related Pathophysiology: Regulation of Oxidative Stress, Inflammation, and Cardiovascular Hypertrophy in Male Rats. *J Cardiovasc Pharmacol, 79*(3), 355-367. doi:10.1097/FJC.0000000000001187
163. Thadathil, N., Xiao, J., Hori, R., Alway, S. E., & **Khan, M. M.** (2021). Brain Selective Estrogen Treatment Protects Dopaminergic Neurons and Preserves Behavioral Function in MPTP-induced Mouse Model of Parkinson's Disease. *J Neuroimmune Pharmacol, 16*(3), 667-678. doi:10.1007/s11481-020-09972-1
164. Thiele, E. A., Bebin, E. M., Filloux, F., Kwan, P., Loftus, R., Sahebkar, F., Sparagana, S., & **Wheless, J.** (2022). Long-term cannabidiol treatment for seizures in patients with tuberous sclerosis complex: An open-label extension trial. *Epilepsia, 63*(2), 426-439. doi:10.1111/epi.17150

165. Thomas, K. T., & **Zakharenko, S. S.** (2021). MicroRNAs in the Onset of Schizophrenia. *Cells, 10*(10). doi:10.3390/cells10102679
166. Thomas, M. H., Gui, Y., Garcia, P., Karout, M., Gomez Ramos, B., Jaeger, C., Michelucci, A., Gaigneaux, A., Kollmus, H., Centeno, A., Schughart, K., Balling, R., Mittelbronn, M., Nadeau, J. H., Sauter, T., **Williams, R. W.**, Sinkkonen, L., & Buttini, M. (2021). Quantitative trait locus mapping identifies a locus linked to striatal dopamine and points to collagen IV alpha-6 chain as a novel regulator of striatal axonal branching in mice. *Genes Brain Behav, 20*(8), e12769. doi:10.1111/gbb.12769
167. Torres-Rojas, C., Zhao, W., Zhuang, D., O'Callaghan, J. P., **Lu, L.**, **Mulligan, M. K.**, **Williams, R. W.**, & **Jones, B. C.** (2021). Paraquat Toxicogenetics: Strain-Related Reduction of Tyrosine Hydroxylase Staining in Substantia Nigra in Mice. *Front Toxicol, 3*, 722518. doi:10.3389/ftox.2021.722518
168. Tremblay, M. G., Sibai, D. S., Valere, M., Mars, J. C., Lessard, F., Hori, R. T., **Khan, M. M.**, Stefanovsky, V. Y., LeDoux, M. S., & Moss, T. (2022). Ribosomal DNA promoter recognition is determined in vivo by cooperation between UBTF1 and SL1 and is compromised in the UBTF-E210K neuroregression syndrome. *PLoS Genet, 18*(2), e1009644. doi:10.1371/journal.pgen.1009644
169. Trotter, C., Kim, H., Farage, G., Prins, P., **Williams, R. W.**, Broman, K. W., & Sen, S. (2021). Speeding up eQTL scans in the BXD population using GPUs. *G3 (Bethesda), 11*(12). doi:10.1093/g3journal/jkab254
170. Udell, M. E., Ni, J., Garcia Martinez, A., **Mulligan, M. K.**, Redei, E. E., & **Chen, H.** (2021). TailTimer: A device for automating data collection in the rodent tail immersion assay. *PLoS One, 16*(8), e0256264. doi:10.1371/journal.pone.0256264
171. Van Gelder, R. N., Chiang, M. F., **Dyer, M. A.**, Greenwell, T. N., Levin, L. A., Wong, R. O., & Svendsen, C. N. (2022). Regenerative and restorative medicine for eye disease. *Nat Med, 28*(6), 1149-1156. doi:10.1038/s41591-022-01862-8
172. Vial, F., McGurrin, P., Attaripour, S., **d'Azzo, A.**, Tifft, C. J., Toro, C., & Hallett, M. (2022). Myoclonus generators in sialidosis. *Clin Neurophysiol Pract, 7*, 169-173. doi:10.1016/j.cnp.2022.05.004
173. Victor, A. K., Donaldson, M., Johnson, D., Miller, W., & **Reiter, L. T.** (2021). Molecular Changes in Prader-Willi Syndrome Neurons Reveals Clues About Increased Autism Susceptibility. *Front Mol Neurosci, 14*, 747855. doi:10.3389/fnmol.2021.747855
174. Wang, H., Del Mar, N., Deng, Y., & **Reiner, A.** (2021). Rescue of BDNF expression by the thalamic parafascicular nucleus with chronic treatment with the mGluR2/3 agonist LY379268 may contribute to the LY379268 rescue of enkephalinergic striatal projection neurons in R6/2 Huntington's disease mice. *Neurosci Lett, 763*, 136180. doi:10.1016/j.neulet.2021.136180
175. Wang, J., **Miller, D. D.**, & Li, W. (2022). Molecular interactions at the colchicine binding site in tubulin: An X-ray crystallography perspective. *Drug Discov Today, 27*(3), 759-776. doi:10.1016/j.drudis.2021.12.001
176. Wechsler, R. T., **Wheless, J.**, Zafar, M., Huesmann, G. R., Lancman, M., Segal, E., Chez, M., Aboumatar, S., Patten, A., Salah, A., & Malhotra, M. (2022). PROVE: Retrospective, non-interventional, Phase IV study of perampanel in real-world clinical care of patients with epilepsy. *Epilepsia Open, 7*(2), 293-305. doi:10.1002/epi4.12575
177. **Wheless, J.**, Peters, J., Misra, S. N., Becker, D., Rabinowicz, A. L., Sirven, J., & Carrazana, E. (2022). Comment on "Intranasal midazolam versus intravenous/rectal benzodiazepines for acute seizure control in children: A systematic review and meta-analysis". *Epilepsy Behav, 128*, 108550. doi:10.1016/j.yebeh.2021.108550
178. **Wheless, J. W.** (2021). A critical evaluation of midazolam nasal spray for the treatment of patients with seizure clusters. *Expert Rev Neurother, 21*(11), 1195-1205. doi:10.1080/14737175.2021.1890033
179. **Wheless, J. W.**, Miller, I., Hogan, R. E., Dlugos, D., Biton, V., Cascino, G. D., Sperling, M. R., Liow, K., Vazquez, B., Segal, E. B., Tarquinio, D., Mauney, W., Desai, J., Rabinowicz, A. L., Carrazana, E., & Group, D. S. (2021). Final results from a Phase 3, long-term, open-label, repeat-dose safety study of diazepam nasal spray for seizure clusters in patients with epilepsy. *Epilepsia, 62*(10), 2485-2495. doi:10.1111/epi.17041
180. Williams, C., Sakaria, R. P., & **Pourcyrous, M.** (2022). Early-Onset Fulminant Sepsis in a Preterm Neonate due to Streptococcus gallolyticus : A Case Report and Literature Review. *AJP Rep, 12*(1), e117-e122. doi:10.1055/a-1762-0096

181. Williams, E. G., Pfister, N., Roy, S., Statzer, C., Haverty, J., Ingels, J., Bohl, C., Hasan, M., Cuklina, J., Buhlmann, P., Zamboni, N., **Lu, L.**, Ewald, C. Y., **Williams, R. W.**, & Aebersold, R. (2022). Multiomic profiling of the liver across diets and age in a diverse mouse population. *Cell Syst, 13*(1), 43-57 e46. doi:10.1016/j.cels.2021.09.005
182. Wu, H. Y., Rong, Y., Bansal, P. K., Wei, P., Guo, H., & **Morgan, J. I.** (2022). TTLL1 and TTLL4 polyglutamylases are required for the neurodegenerative phenotypes in pcd mice. *PLoS Genet, 18*(4), e1010144. doi:10.1371/journal.pgen.1010144
183. Xu, X., Du, L., **Jiang, J.**, Yang, M., Wang, Z., Wang, Y., Tang, T., Fu, X., & Hao, J. (2021). Microglial TREM2 Mitigates Inflammatory Responses and Neuronal Apoptosis in Angiotensin II-Induced Hypertension in Middle-Aged Mice. *Front Aging Neurosci, 13*, 716917. doi:10.3389/fnagi.2021.716917
184. Yang, C., Wang, Y., Sims, M. M., He, Y., **Miller, D. D.**, & Pfeffer, L. M. (2021). Targeting the Bromodomain of BRG-1/BRM Subunit of the SWI/SNF Complex Increases the Anticancer Activity of Temozolomide in Glioblastoma. *Pharmaceuticals (Basel), 14*(9). doi:10.3390/ph14090904
185. Yaw, A. M., Glass, J. D., **Prosser, R. A.**, & Caldwell, H. K. (2022). Paternal Cocaine in Mice Alters Social Behavior and Brain Oxytocin Receptor Density in First Generation Offspring. *Neuroscience, 485*, 65-77. doi:10.1016/j.neuroscience.2022.01.010
186. Yeomans, D. C., Hanson, L. R., Carson, D. S., **Tunstall, B. J.**, Lee, M. R., Tzabazis, A. Z., Jacobs, D., & Frey, W. H., 2nd. (2021). Nasal oxytocin for the treatment of psychiatric disorders and pain: achieving meaningful brain concentrations. *Transl Psychiatry, 11*(1), 388. doi:10.1038/s41398-021-01511-7
187. Young, M., Delaney, A., Jurbergs, N., Pan, H., Wang, F., **Boop, F. A.**, & Merchant, T. E. (2022). Radiotherapy alone for pediatric patients with craniopharyngioma. *J Neurooncol, 156*(1), 195-204. doi:10.1007/s11060-021-03908-2
188. Yu, W., **Mulligan, M. K.**, **Williams, R. W.**, & Meisler, M. H. (2022). Correction of the hypomorphic Gabra2 splice site variant in mouse strain C57BL/6J modifies the severity of Scn8a encephalopathy. *HGG Adv, 3*(1), 100064. doi:10.1016/j.xhgg.2021.100064
189. Zaso, M. J., **Youngentob, S. L.**, & Park, A. (2021). Characterizing the role of early alcohol reexposure in associations of prenatal alcohol exposure with adolescent alcohol outcomes. *Alcohol Clin Exp Res, 45*(7), 1436-1447. doi:10.1111/acer.14632
190. Zhang, C., Sajith, A. M., Xu, X., **Jiang, J.**, Phillip Bowen, J., Kulkarni, A., & Hao, J. (2022). Targeting NLRP3 signaling by a novel-designed sulfonylurea compound for inhibition of microglial inflammation. *Bioorg Med Chem, 58*, 116645. doi:10.1016/j.bmc.2022.116645

APPENDIX 3

Neuroscience Seminar Speakers

FY 20220-2023

NEUROSCIENCE SEMINAR SERIES SCHEDULE

Fall 2022

Kumar Vivek, Ph.D — August 30, 2022
Associate Professor
Addiction Biology
Jackson Laboratory
Host: Students

Title: "Advanced Mouse Phenotyping with Computer Vision and Machine Learning"

Jeremy McIntyre, Ph.D. — September 20, 2022
Assistant Professor
Neuroscience
University of Florida
Host: Dr. Max Fletcher

Title: "The role of neuronal cilia as modulatory signaling centers"

Corinde E. Weirs, Ph.D. — Zoom — September 27, 2022
Assistant Professor
Psychiatry and Radiology
University of Pennsylvania
Host: Brendan Tunstall

Title: "Nutritional ketosis as a potential treatment of alcohol use disorder"

Keith Hengen, Ph.D. — October 4, 2022
Assistant Professor
Department of Biology
University of Wisconsin-Madison
Host: Dr. Detlef Heck

Title: "Does sleep restore an optimal computational regime in the brain? Network dynamics in long-term recordings point to an answer"

Jenna McHenry, Ph.D. October 11, 2022
Assistant Professor
Department of Psychological and Neuroscience
Duke University
Host: Dr. Jianyang Du

Title: "Illuminating social state dynamics in neural circuits for motivated behavior "

Un Jung Kang, M.D. October 18, 2022
Professor
Neurology
NYU Grossman School of Medicine
Host: Fu-ming Zhou

Title: "Aberrant plasticity in PD therapy"

Matthew Campbell, Ph.D. Zoom November 1, 2022
Smurfit Institute of Genetics
Trinity College Dublin, Ireland
Host: Raja Gangaraju

Title: "Regulation of the blood-barrier in health and disease"

Nabil J. Alkayed, M.D., Ph.D. November 8, 2022
Professor and Director of Research
Knight Cardiovascular Institute
Oregon Health and Science University
Host: Tauheed Ishrat

Title: "Novel Therapeutic Targets for Vascular Cognitive Impairment and Dementia"

Weizhe Hong, Ph.D. Zoom November 29, 2022
Associate Professor
Neurobiology

UCLA
Host: Jianyang Du

Title: "Understanding the Social Brain"

Seonil Kim, Ph.D. December 6, 2022
Assistant Professor
Biomedical Sciences
Colorado State University
Host: Il Hwan Kim

Title: "The Autism-Associated delta-Catenin Mutation Induces Social Deficits in Mice"

Theanne Griffith, Ph.D. Zoom December 13, 2022
Assistant Professor
Physiology and Membrane Biology
UC Davis
Host: Valeria Vasquez

Title: "Illuminating new roles for Nav1.1 in somatosensory signaling and behavior"

NEUROSCIENCE SEMINAR SERIES SCHEDULE

Spring 2023

Qian-Quan Sun, Ph.D. — February 7, 2023
Professor
Zoology and Physiology
University of Wyoming
Host: Dr. Jianxiong Jiang

Title: "Interneuropathy in the thalamocortical network links epilepsy with psychiatric disorders"

Veronica Flores, Ph.D. — February 28, 2023
Assistant Professor
Psychology
Furman University
Host: Dr. Max Fletcher

Title: "Cortical Taste Processing Evolves through Benign Taste Exposures"

Rajtarun Madangopal, Ph.D. — March 7, 2023
Scientist
National Institute of Drug Abuse
National Institute of Health
Host: Brendan Tunstall

Title: "Fos and Calcium Ensembles in Learned Behaviors"

Robert Smith, M.D., Ph.D. — March 14, 2023
Professor, Chair
Neurosciences

University of Toledo
Host: Dr. Jianyang Du

Title: "Assessment of Protein kinase signaling networks in complex biological substrates"

Thyagarajan Subramanian, M.D., Ph.D. March 21, 2023
Professor
Neurology
University of Toledo
Host: Dr. Fu-ming Zhou

Title: "Maladaptive neuroplasticity in Parkinson's disease: basic science to therapeutic testing"

Christoph Kellendonk, Ph.D. Zoom March 28, 2023
Associate Professor
Psychiatry
Columbia University
Host: Fu-ming Zhou

Title: "Dopamine D2 receptors and striatal circuit function"

Udai Bhan Pandey, Ph.D. April 4, 2023
Associate Professor
Human Genetics
University of Pittsburgh
Host: Mohammad Moshahid Khan

Title: "Identifying hidden GEM's in neurological diseases"

Jungsu Kim, Ph.D. April 18, 2023
Professor
Medical and Molecular Genetics
Indiana University
Host: Mohammad Moshahid Khan

Title: "Targeting Astrocytes and Microglia for Alzheimer's disease"

Jason Yi, Ph.D. — April 25, 2023
Assistant Professor
Neuroscience
Washington University of St. Louis
Host: Larry Reiter

Title: "A functional genetic approach to Angelman Syndrome"

Charles Cox, M.D. — May 2, 2023
Professor
Institute of Molecular Medicine for Prevention of Human Diseases
University of Texas School of Medicine
Host: Rajashekhar Gangaraju

Title: "Cellular Therapies for Neurological Injuries"

Longjun Wu, Ph.D. — May 9, 2023
Professor
Neurology
Mayo Clinic
Host: Jianxiong Jiang

Title: "Neuroimmune Interaction in Health and Disease"

APPENDIX 4

Neuroscience News, Events and Graduate Training Flyer

FY 2022-2023

UTHSC NEUROSCIENCE INSTITUTE

Nov. 29, 2022

Neuroscience Institute (NI) Postdoctoral/Research Associate Support

Purpose and Eligibility: The NI solicits proposals for supplementary funds for postdoctoral fellows whose UTHSC mentors are active tenured or tenure-track faculty members of NI. Mentors should be currently funded or working on a no-cost extension of a competitively renewable grant. Those working with faculty currently on NI seed support are ineligible for this award. *Research associates may apply, but their applications will be considered only if there are insufficient meritorious applications from postdoctoral fellows.*

Although we try to rotate funding to new applicants, currently funded postdocs (or research associates) **with no more than one year of previous NI matching support** can to apply for a one year, competitive renewal.

Support: The NI provides $10,000-15,000 in matching funds to NI mentors, to be used toward the salary/fringe of each awarded applicant. The award amount and number of postdocs funded will be determined during evaluation, and will depend on the number of quality applicants we receive.

Application:

1. New Applicants: The applicant should provide a cover letter requesting support with a brief overview of the proposed research project, a 3-page research proposal, a current CV, and two letters of reference (reference letters can also be emailed directly to NI), one of which must come from the mentor. These documents should be submitted electronically as PDF files. Mentors should provide an updated, brief, NIH-style biosketch attached to their support letter.

2. Renewal applicants: The applicant should submit a 2-page progress report covering the past year's publications, presentations, and research progress. Support letters for renewals are only needed from the mentor, and must comment on the candidate's progress.

Review Process and Criteria: The NI Executive Committee will review applications. Criteria include evidence of productivity in neuroscience research, with particular value attached to first author publications.

Deadline: **Jan. 1, 2023**. Awards will run from Jan. 1, 2023-Dec. 31, 2023.

Submission: Please send all materials electronically to:
Brandy Fleming, Program Coordinator
Neuroscience Institute
bflemin3@uthsc.edu.
Phone: 448-1286

UTHSC Team Receives $2.16 Million To Test Potential New Alzheimer-Fighting Compound

Written by Lee Ferguson | July 14, 2022

Contact

Communications and Marketing (https://uthsc.edu/communications-marketing/)
Email: **communications@uthsc.edu (mailto:communications@uthsc.edu)**

Dr. Francesca-Fang Liao

The National Institute on Aging recently awarded $2.16 million to a team of investigators from the University of Tennessee Health Science Center (UTHSC) testing a new way to combat the root cause of neurodegenerative disorders such as Alzheimer's Disease. Francesca-Fang Liao, PhD, professor of Pharmacology, Addiction Science and Toxicology in the College of Medicine, is the NIH contact principal investigator on the project. Wei Li, PhD, distinguished professor in the Department of Pharmaceutical Sciences in the College of Pharmacy, is a multiple principal investigator.

A number of progressive neurodegenerative diseases, such as Alzheimer's, involve the abnormal accumulation of a key protein, tau, in the brain. In healthy neurons, tau binds to and stabilizes internal support structures called microtubules, which help guide nutrients and molecules from the one part of the nerve cell to another. In diseased patients, stressful signals in the brain alter tau, causing it to misfold and detach from microtubules, forming neurofibrillary tangles which are toxic to neurons.

Dr. Wei Li

A breakdown in the signaling pathways that can rid cells of misfolded tau and prevent its accumulation is the focus of Dr. Liao's project. Her team is examining new mechanisms that might cause these breakdowns, zeroing in on the link between oxidative stress and the activity of a particular enzymatic molecule, otulin. In previous studies, Dr. Liao has found that inhibiting otulin prevented the accumulation of tau. She hypothesizes that oxidative stress activates otulin, which increases tau aggregation and neurotoxicity. Her project aims to investigate both the mechanisms that regulate tau accumulation, and the mechanisms affected by oxidative stress during otulin-induced tauopathies. It will also test a new otulin-inhibiting drug developed by Dr. Li for its effectiveness in promoting tau clearance and reducing tau's cellular toxicity.

"We are extremely excited to work together as a team to further validate a potential use of this compound in translation," Dr. Liao said.

Tags: **Dr. Wei Li (https://news.uthsc.edu/tag/dr-wei-li/)**, **UTHSC College of Medicine (https://news.uthsc.edu/tag/uthsc-college-of-medicine/)**, **UTHSC College of Pharmacy (https://news.uthsc.edu/tag/uthsc-college-of-pharmacy/)**

UTHSC Team Receives $2.13 Million National Award to Study Early-Stage Development of the Cerebellum

Written by Lee Ferguson | September 2, 2022

The National Institute of Neurological Disorders and Stroke has awarded $2.13 million to a University of Tennessee Health Science Center (UTHSC) team studying how neural cells that build a functional brain are generated during embryonic and neonatal life. Viktor Chizhikov, PhD, associate professor in the Department of Anatomy and Neurobiology, is the principal investigator. Igor Iskusnykh, PhD, instructor in the same department, contributed significantly to the project.

Dr. Igor Iskusnykh (left), Dr. Viktor Chizhikov (right)

During brain development, different types of neurons must be produced in appropriate proportions in order for healthy neural circuits to be formed. Research suggests that disorders such as autism may be caused by these scaling processes gone awry. But little is known about the machinery that scales the number of functionally related neurons in the brain.

In this study, Dr. Chizhikov's team aims to define the molecular mechanisms that regulate early neuron development, using the cerebellum in an animal model. The team will work to answer questions such as, what genes coordinate the growth and movement of neuron progenitors? How are these genes regulated during normal brain development? What signaling pathways are involved in neural cell growth and production? How does the machinery that controls neuronal growth get disrupted in patients with brain overgrowth disorders?

Answering these questions may help future research pinpoint where and when neural scaling goes off course, which will have a large impact on understanding autism and other developmental brain disorders, and our ability to develop new treatments.

Tags: **Department of Anatomy and Neurobiology (https://news.uthsc.edu/tag/department-of-anatomy-and-neurobiology/)**, **National Institute of Neurological Disorders and Stroke (https://news.uthsc.edu/tag/national-institute-of-neurological-disorders-and-stroke/)**, **UTHSC Office of Research (https://news.uthsc.edu/tag/uthsc-office-of-research/)**

Contact

Communications and Marketing (https://uthsc.edu/communications-marketing/)

Email: **communications@uthsc.edu (mailto:communications@uthsc.edu)**

Memphis, Tennessee 38163
Main: 901.448.5500
TDD: 901.448.7382

UTHSC Team Awarded $1.9 Million to Study Neuronal Activity in Central Taste Regions of the Brain

Written by Amber Dean | September 14, 2022

The National Institute of Deafness and Other Communication Disorders has awarded $1.9 million to John Boughter, PhD, professor in the Department of Anatomy and Neurobiology and co-director of the Neuroscience Institute at the University of Tennessee Health Science Center (UTHSC), to study the brain circuitry involved in processing novel tastes and foods. Max Fletcher, PhD, associate professor in the Department of Anatomy and Neurobiology, is also a principal investigator on the award.

Dr. John Boughter

Neophobia, or the fear of anything new, is an important concern in pediatric psychology. In children, the term generally refers to a tendency to reject unknown or new foods. A persistent unwillingness to try new foods or break from routine food choices can have both acute health consequences for a child and long-lasting effects that lead to eating disorders, poor health outcomes, and disease.

Little is known about the underlying neural circuits involved in taste neophobia. In this project, Dr. Boughter, Dr. Fletcher and their team will work to understand how information regarding the newness or familiarity of tastes are encoded within brain circuits. They hypothesize that neophobia is driven by enhanced responses in both the cortex and thalamus, while the process of learning that a new stimulus is safe to consume is mediated by a neurotransmitter (acetylcholine) released from forebrain inputs. Findings from the study will increase understanding of taste learning and the mechanics within sensory regions that process new sensations.

"Food neophobia is an important behavior for most animals," Dr. Boughter said. "It is important to understand its neural organization in order to gain new insights into how feeding behaviors are controlled by the brain."

Tags: **Department of Anatomy and Neurobiology (https://news.uthsc.edu/tag/department-of-anatomy-and-neurobiology/)**, **National Institute of Deafness and Other Communication Disorders (https://news.uthsc.edu/tag/national-institute-of-deafness-and-other-communication-disorders/)**, **UTHSC Office of Research (https://news.uthsc.edu/tag/uthsc-office-of-research/)**

Contact

Communications and Marketing (https://uthsc.edu/communications-marketing/)
Email: **communications@uthsc.edu (mailto:communications@uthsc.edu)**

UTHSC Researcher Co-Leads Study of Genes that Modulate Aging, Lifespan

Written by Lee Ferguson | October 5, 2022

Scientists led by the University of Tennessee Health Science Center (UTHSC) and the École Polytechnique Fédérale de Lausanne (EPFL) in Switzerland are exploring the elaborate interplay between genes, sex, growth, and age and how they influence variation in longevity. Their findings, which are being published in the peer-reviewed journal Science, are an important step in understanding why some people live longer than others and provide a basis for future studies to improve healthspan.

Dr. Robert Williams

Robert Williams, PhD, chair of the Department of Genetics and Genomics in UTHSC's College of Medicine, along with Johan Auwerx, MD, PhD, professor and director of the Laboratory for Integrated and Systems Physiology at EPFL, started a program in 2016 to define genetic factors underlying aging and lifespan. "Finding common molecular pathways that control differences in rate of aging is critical to our understanding of how individuals differ in their health and lifespan," Dr. Williams said. "Such insights may help us work out ways to intervene rationally."

Drs. Williams and Auwerx worked with colleagues at the National Institute on Aging's Interventions Testing Program (ITP), which donated DNA of over 12,000 mice to the project. ITP mice are genetically heterogeneous. Each of the 27,574 mice studied is a full sibling, sharing half its genetic inheritance with each other mouse in the program, and each has a known lifespan, making them an ideal system to study.

EPFL and UTHSC researchers measured the genetic makeup of more than 3,000 mice, all of them genetic brothers or sisters. The mice were then genotyped and allowed to live until their natural death. The researchers then explored the relationship between DNA difference and differences in the lifespan of each mouse. This genetic mapping allowed the teams to define stretches of DNA in genomes that affect longevity. The results show the DNA segments, or loci, associated with longevity are largely specific to sex, with females having a region in chromosome 3 that affects lifespan. When the males who died early due to non-aging-related reasons were removed from the analysis, additional genetic signals started to emerge, suggesting some genetic variations only affect lifespan after a certain age.

In addition to finding genetic determinants of longevity, the researchers explored other contributors. In general, bigger mice die younger. The researchers found that some, but not all, of the genetic effects on longevity are through effects on growth. One of the non-genetic effects may be how early access to food affects growth. They observed that mice from smaller litters tended to be heavier adults and live shorter lives. Mice from larger litters that had to share their mother's milk with more siblings, grew more slowly and lived longer on average. The researchers corroborated these trends of early growth versus longevity in large human datasets with hundreds of thousands of participants.

Beyond characterizing how longevity is affected, the researchers worked to find genes most likely to play a role in longevity determination. They measured the effect of DNA variation on how genes are expressed and compared their analyses with multiple human and non-human databases. From this they nominated a few genes likely to modulate aging rates. They then tested the effects of manipulating these genes in roundworms and found that a subset of gene perturbations did in fact affect the lifespan. The results of this study will be a rich resource of aging genes that will hopefully guide the design of therapies that not only extend lifespan, but also healthspan.

Funding for the project was provided by the NIA, EPFL, the European Research Council, the Swiss National Science Foundation, and the Glenn Foundation for Medical Research. The paper, titled **"Sex- and age-dependent genetics of longevity in a heterogeneous mouse population (https://www.science.org/doi/10.1126/science.abo3191)**," is in the October 2022 issue of Science.

Tags: **Department of Genetics and Genomics (https://news.uthsc.edu/tag/department-of-genetics-and-genomics/)**, **École Polytechnique Fédérale de Lausanne (https://news.uthsc.edu/tag/ecole-polytechnique-federale-de-lausanne/)**, **Office of Research (https://news.uthsc.edu/tag/office-of-research/)**

Contact

Communications and Marketing (https://uthsc.edu/communications-marketing/)
Email: **communications@uthsc.edu (mailto:communications@uthsc.edu)**

Dopico Awarded $2.6 Million for Project to Understand and Treat Alcohol-Induced Blackouts

Written by Lee Ferguson | November 16, 2022

Contact

Communications and Marketing (https://uthsc.edu/communications-marketing/)
Email: **communications@uthsc.edu (mailto:communications@uthsc.edu)**

The National Institute on Alcohol Abuse and Alcoholism has awarded $2.6 million to Alex M. Dopico, MD, PhD, Van Vleet Chair of Excellence and professor in the **Department of Pharmacology, Addiction Science, and Toxicology (PHAST) (https://www.uthsc.edu/pharmacology/)** at the University of Tennessee Health Science Center, to study cerebrovascular dysfunction that could contribute to alcohol-induced blackouts.

Alcohol-induced blackouts are a form of amnesia caused when a person drinks heavily enough to temporarily block the transfer of memories from short- to long-term storage — known as memory consolidation — in the brain's hippocampus. These blackouts can occur in anyone who heavily drinks within a short period, regardless of age, education, socioeconomic status, drinking history, sex, or sexual orientation. A serious consequence of alcohol misuse, alcohol-induced blackouts drastically increase the risk for dangerous behaviors, injuries, and other harms.


Dr. Alex M. Dopico

Previous studies have sought the cellular basis of alcohol-induced blackouts, focusing primarily on neuronal or glial elements. Dr. Dopico's study departs from all previous research by focusing instead on blood perfusion of this brain region. His project builds on his years of research and his discovery of a molecular site in BK channel protein receptors where alcohol is recognized and interacts to make cerebral arteries contract.

Dr. Dopico's team, including Anna Bukiya, PhD, and Brendan Tunstall, PhD, both faculty in the PHAST department, will explore how, at concentrations reached in the brain during alcohol-induced blackouts, these amino acids cause artery constriction, regional hippocampal ischemia, and ultimately, blackouts. The team will use a wide array of methodologies, from computational models of alcohol-BK receptor interaction to behavioral testing in animal models. They aim to fully characterize the vascular target for alcohol, the first step in designing drugs to counteract alcohol-induced blackouts. They will examine whether there is a difference between the biological sexes in how the target responds to alcohol action. Finally, they will test the effectiveness of their newly discovered vasomodulator as a possible treatment.

"As recently done in other fields within the neurosciences, such as neurodegeneration, cognition deficits, and dementia, we are bringing a vascular component(s) as central to the pathophysiology of substance use disorders, alcohol-induced blackouts in particular," Dr. Dopico said.

Tags: **alcohol-induced blackouts (https://news.uthsc.edu/tag/alcohol-induced-blackouts/)**, **Alex M. Dopico (https://news.uthsc.edu/tag/alex-m-dopico/)**, **PHAST (https://news.uthsc.edu/tag/phast/)**, **Research (https://news.uthsc.edu/tag/research/)**

Department of Defense Grant to Fund Dementia Treatment Study

Written by Christopher Green | February 17, 2023

Contact

Communications and Marketing (https://uthsc.edu/communications-marketing/)
Email: **communications@uthsc.edu (mailto:communications@uthsc.edu)**

Dr. Mohammad Moshahid Khan

Repeated traumatic brain injuries (TBI) in soldiers and military personnel can cause behavioral, neurological, and cognitive effects and lead to dementia. There is currently no treatment for that type of dementia, but a $308,000 grant from the United States Department of Defense aims to help researchers at the University of Tennessee Health Science Center find one.

TBI can lead to the development of frontotemporal degeneration (FTD), a progressive process marked by atrophy of the frontal and temporal lobes. FTD is one of the most common causes of dementia in people under the age of 65.

Principal investigator Mohammad Moshahid Khan, PhD, associate professor in the **Department of Neurology (https://www.uthsc.edu/neurology/)**, and co-investigator Tayebeh Pourmotabbed, PhD, professor in the **Department of Microbiology, Immunology, and Biochemistry (https://www.uthsc.edu/medicine/molecular-sciences/index.php)**, are working on a project to find the first therapeutic intervention to prevent frontotemporal dementia or slow its progression in a mouse model linked with the condition.

Dr. Tayebeh Pourmotabbed

The team is aiming to use a novel gene therapy called DNAzymes to target pathological tau aggregates, which cause frontotemporal dementia and its resulting cognitive impairment and progressive neuropathological symptoms. The team is examining the effective dose, frequency, and duration of treatment as well as its potential in reducing neurodegeneration and behavioral deficits in mice.

“Our preliminary data suggest that DNAzyme is a novel therapeutic approach and has a great potential for preventing the accumulation of pathological tau,” Dr. Khan said. “The results of this proposal would be foundational for future studies examining the clinical use of DNAzyme for other neurological diseases associated with traumatic brain injury and other tauopathies.”

Newly Funded Study Focuses on HIV-Induced Aging, Alzheimer's Disease

Written by Lee Ferguson | March 9, 2023

HIV in the United States has become a manageable disease, thanks to the free and wide accessibility of antiretroviral therapy. Antiretrovirals work by preventing the virus from making copies of itself by blocking stages of its life cycle. But these drugs have poor permeability in the brain. HIV replication persists in brain cells, causing HIV-associated neurocognitive disorders. Additionally, the HIV population is aging. More than 50% of the HIV population in the U.S. will soon reach their 60s, the prime decade when Alzheimer's disease symptoms begin to manifest. The coupling of these factors have made it critically important to examine the relationship between HIV-induced aging and Alzheimer's disease.

Dr. Tauheed Ishrat

Dr. Santosh Kumar

A team at the University of Tennessee Health Science Center has taken on this challenge, with the help of a $423,500 grant from the National Institute on Aging. Santosh Kumar, PhD, professor in the **Department of Pharmaceutical Sciences (https://uthsc.edu/pharmacy/dps/)**, and Tauheed Ishrat, PhD, professor in the **Department of Anatomy and Neurobiology (https://www.uthsc.edu/anatomy-neurobiology/)**, are working to define the underlying mechanisms contributing to Alzheimer's disease-associated neurodegeneration and memory impairment in the HIV population. Their project involves developing a new drug delivery system and regimens to facilitate drug permeability to the brain. Increased HIV suppression in the brain will subsequently decrease HIV-associated neurocognitive disorder, aging, and Alzheimer's disease-related pathology.

"Our research goal is to better manage cognitive decline and Alzheimer's disease pathologies in HIV/AIDS populations who are aging," Dr. Kumar said.

The specific research will focus on how novel extracellular vesicles carry specific molecules, including viral proteins, from HIV-infected brain cells and deliver them to neuronal cells. The team hypothesizes that delivery of these vesicles causes a cascade of cellular events that ultimately bring about neuroinflammation and neurodegeneration. The team will also use these extracellular vesicles to carry antiretroviral drugs permeable to brain to suppress brain HIV.

Contact

Communications and Marketing (https://uthsc.edu/communications-marketing/)
Email: **communications@uthsc.edu (mailto:communications@uthsc.edu)**

Collaboration Researching Angelman Syndrome Publishes Findings, Receives $2.4 Million Award

Contact

Communications and Marketing (https://uthsc.edu/communications-marketing/)
Email: **communications@uthsc.edu (mailto:communications@uthsc.edu)**

Written by Lee Ferguson | April 10, 2023

A three-way research collaboration at the University of Tennessee Health Science Center (UTSHC) is achieving crucial advances in finding a new target for Angelman syndrome, a rare neurogenetic disorder characterized by intellectual disability, balance issues, motor impairment, and debilitating seizures.

Julio Cordero-Morales, PhD, and Valeria Vásquez, PhD, both associate professors of Physiology in the UTHSC College of Medicine, have spent years studying the cellular processes of mechanosensation, the conversion of mechanical stimuli into neuronal signals. These complex processes allow us to interpret and navigate the physical world, enabling us to sense our position in space, maintain our balance, and perform coordinated movements like walking.

The mechanosensitive ion channel PIEZO2 is expressed in sensory neurons. It mediates proprioception (the sense that allows us to know where our bodies are in space) and balance. Mice and humans lacking PIEZO2 expression have an unsteady gait, irregular stride and step length, and unstable posture. This phenotype is shared by individuals suffering from Angelman syndrome, which is caused by the loss of *UBE3A* gene expression in neurons.

The investigators suspected that there could be a connection and teamed up with Lawrence Reiter, PhD, professor in the Department of Neurology. Dr. Reiter has over 20 years of experience in the Angelman syndrome field. The research was led by a graduate student, Luis Romero, and an instructor, Rebeca Caires Mugarra, PhD.

“Together, we provided several lines of evidence demonstrating that PIEZO2 currents are reduced in *Ube3a*-deficient mouse neurons and stem cell-derived neurons from individuals with Angelman syndrome,” Dr. Cordero-Morales, lead investigator, said. “Our results demonstrate that PIEZO2 is a potential therapeutic target.”

The team used a dietary fatty acid (linoleic acid) to increase PIEZO2 activity, mechano-excitability, and improve gait in a mouse model of Angelman syndrome. Moreover, the investigators demonstrated that linoleic acid supplementation increased PIEZO2 activity in dental pulp stem cell-derived neurons from multiple individuals with Angelman syndrome, part of a patient repository developed by Dr. Retier.

“Our work represents the first example in which a dietary fatty acid intervention has been used to enhance the function of a mechanosensitive sensory ion channel,” Cordero-Morales said. “We revealed that PIEZO2 function is compromised in Angelman syndrome and that PIEZO2 is a potential pharmacological target for the rescue of ataxia in this neurogenetic disorder.”

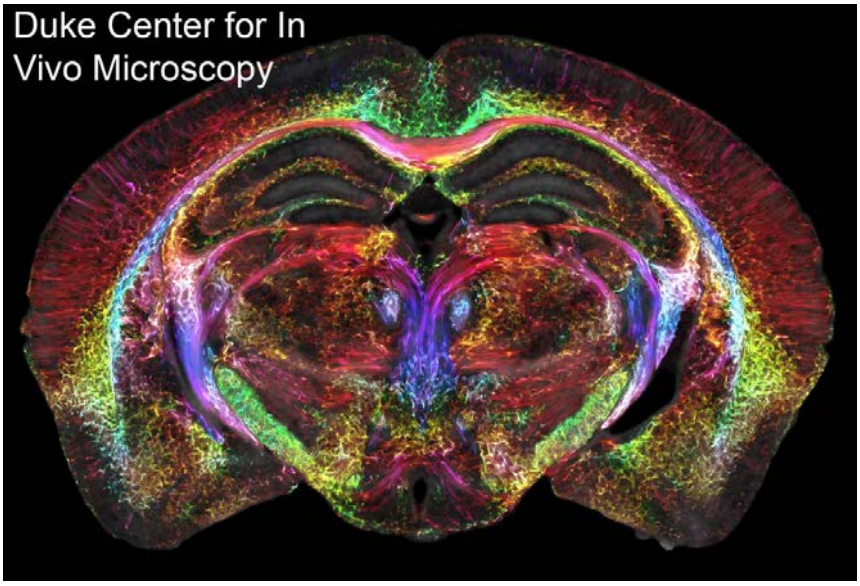
Dr. Julio Cordero-Morales

The project is gaining national recognition and support. The study findings were published in the article "Linoleic acid improves PIEZO2 dysfunction in a mouse model of Angelman Syndrome" in the March 2023 issue of the journal **Nature Communications (https://www.nature.com/articles/s41467-023-36818-0)**, and the investigators were recently awarded $2.4 million by the National Institute of Neurological Disorders and Stroke.

Tags: **Angelman syndrome (https://news.uthsc.edu/tag/angelman-syndrome/)**, **Julio Cordero-Morales (https://news.uthsc.edu/tag/julio-cordero-morales/)**, **Lawrence Reiter (https://news.uthsc.edu/tag/lawrence-reiter/)**, **Luis Romero (https://news.uthsc.edu/tag/luis-romero/)**, **National Institute of Neurological Disorders and Stroke (https://news.uthsc.edu/tag/national-institute-of-neurological-disorders-and-stroke/)**, **Nature Communications (https://news.uthsc.edu/tag/nature-communications/)**, **Neurology (https://news.uthsc.edu/tag/neurology/)**, **Physiology (https://news.uthsc.edu/tag/physiology/)**, **Rebeca Caires Mugarra (https://news.uthsc.edu/tag/rebeca-caires-mugarra/)**, **Research (https://news.uthsc.edu/tag/research/)**, **Valeria Vásquez (https://news.uthsc.edu/tag/valeria-vasquez/)**

UTHSC Researchers Part of Decades-Long Project to Drastically Improve Brain Imaging

Written by Christopher Green | April 26, 2023



An MRI scan with record-breaking resolution merged with light sheet microscopy allows researchers to visualize brain cells in unprecedented detail and to map connections between parts of the brain.

Contact

Communications and Marketing (https://uthsc.edu/communications-marketing/)
Email: **communications@uthsc.edu (mailto:communications@uthsc.edu)**

After nearly 40 years of research, a team including two researchers from the University of Tennessee Health Science Center has published a process for improving magnetic resonance imaging (MRI) capabilities, allowing the researchers to capture brain images at a higher resolution than ever before.

As a result of the study, scientists can now create images that show unprecedented details of cell types and connections between parts of a mouse's brain. The researchers believe this can have broad applications in studies of aging and neurogenerative diseases, including Alzheimer's disease, in humans.

"The primary goal was to make sure we have the technology that allows us to do preclinical research more efficiently and at higher resolution, and we're there now," said Robert W. Williams, PhD, professor in the UTHSC College of Medicine's **Department of Genetics, Genomics, and Informatics (https://www.uthsc.edu/genetics/)**.

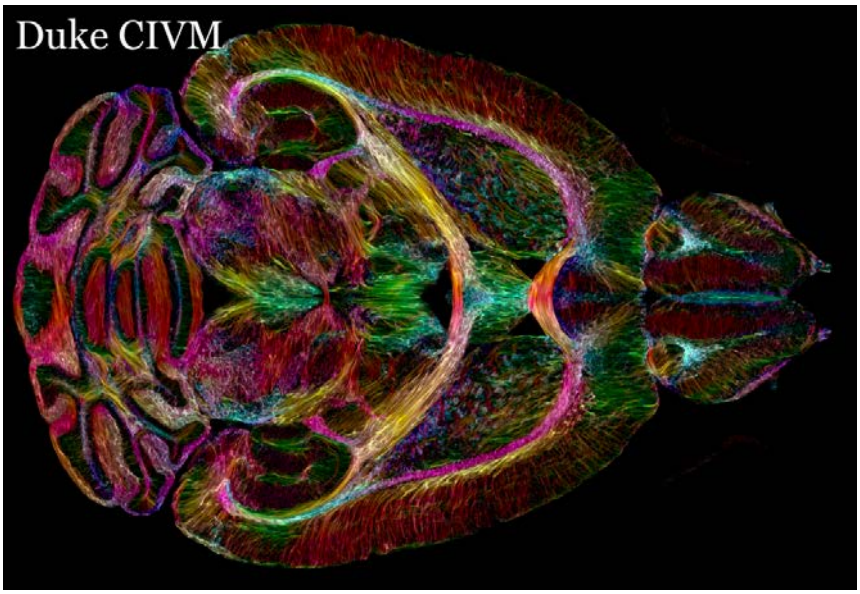
More than 20 years ago, Dr. Williams joined forces with G. Allan Johnson, PhD, the leader of Duke University's Center for In Vivo Microscopy, which started the research project more than a decade earlier. Dr. Williams and his UTHSC colleague David Ashbrook, PhD, were tasked with providing possible applications for Dr. Johnson's work to devise higher resolution and higher throughput methods to image the brain in the

areas of aging and neurodegenerative disease genetics. The study also included six other colleagues from Duke and one each from the University of Pennsylvania, University of Pittsburgh, Indiana University, and LifeCanvas Technologies.

Dr. Robert Williams

In an article published recently in **Proceedings of the National Academy of Sciences (https://www.pnas.org/doi/10.1073/pnas.2218617120)**, Dr. Johnson, the lead author, describes the two-step process for obtaining such clear brain images. High-computing pipelines merge the improved MR scans, which allow scientists to map the circuits of the brain, with light sheet microscopy, which allows scientists to label groups of brain cells. Combining the complementary techniques is a groundbreaking method that provides a vivid view into what is going on inside the brain.

"By jacking up the resolution, as we have in both the MR and the light sheet, we're getting closer to where everything is happening in the brain," Dr. Johnson said. "We are not encumbered by having all of the rest of the population of the human brain to keep us from coning our focus down close to the operational units, whatever they happen to be, of the animal model of interest."



Track density imaging shows the connecting fibers of the brain. The fibers are color coded to show their direction; green fibers span from the back to the front of the brain, red from left to right, and blue fibers run in and out of the plane.

Not only does the process allow for clearer images, but it also allows the researchers to have a much higher throughput. According to Dr. Williams, "If you tried to do this 10 years ago, it would have been one case a week. Dr. Johnson can process two cases a day, and that's enough to do some serious, serious science."

While the technology won't be used to treat patients with neurogenerative diseases, it is already being used to study those illnesses. Dr. Williams has created mouse models of Alzheimer's disease that meaningfully replicate the disease in humans. Using the models, the team is investigating whether dietary changes could extend the part of a

person's life in which cognition is intact. With the new imaging techniques, the disease can be studied in the mice in a way Dr. Johnson described as "gloriously simple, but gloriously robust."

"If you do that study in a clinical population, you're talking about tens to hundreds of millions of dollars," he said. "We can now examine these diseases in a much more controlled environment, at orders of magnitude lower cost, and with orders of magnitude higher fidelity."

The team's success in improving brain imaging has opened the door for more advanced studying of neurogenetics and of "diseases that are important to all of us," Dr. Williams said. It is the culmination of decades of work of people from multiple organizations and multiple disciplines — biomedical technology and neurogenetics.

"When you have two completely different areas of research, the sum is considerably more than the parts," Dr. Johnson said. "The fact that we have two completely different views of the world, two completely different areas of research, but we've been able to merge them together, it gives us some capacity that others don't have."
Tags: **Alzheimer's disease (https://news.uthsc.edu/tag/alzheimers-disease/)**, **David Ashbrook (https://news.uthsc.edu/tag/david-ashbrook/)**, **Genetics Genomics and Informatics (https://news.uthsc.edu/tag/genetics-genomics-and-informatics/)**, **MRI (https://news.uthsc.edu/tag/mri/)**, **Proceedings of the National Academy of Sciences (https://news.uthsc.edu/tag/proceedings-of-the-national-academy-of-sciences/)**, **Robert Williams (https://news.uthsc.edu/tag/robert-williams/)**