

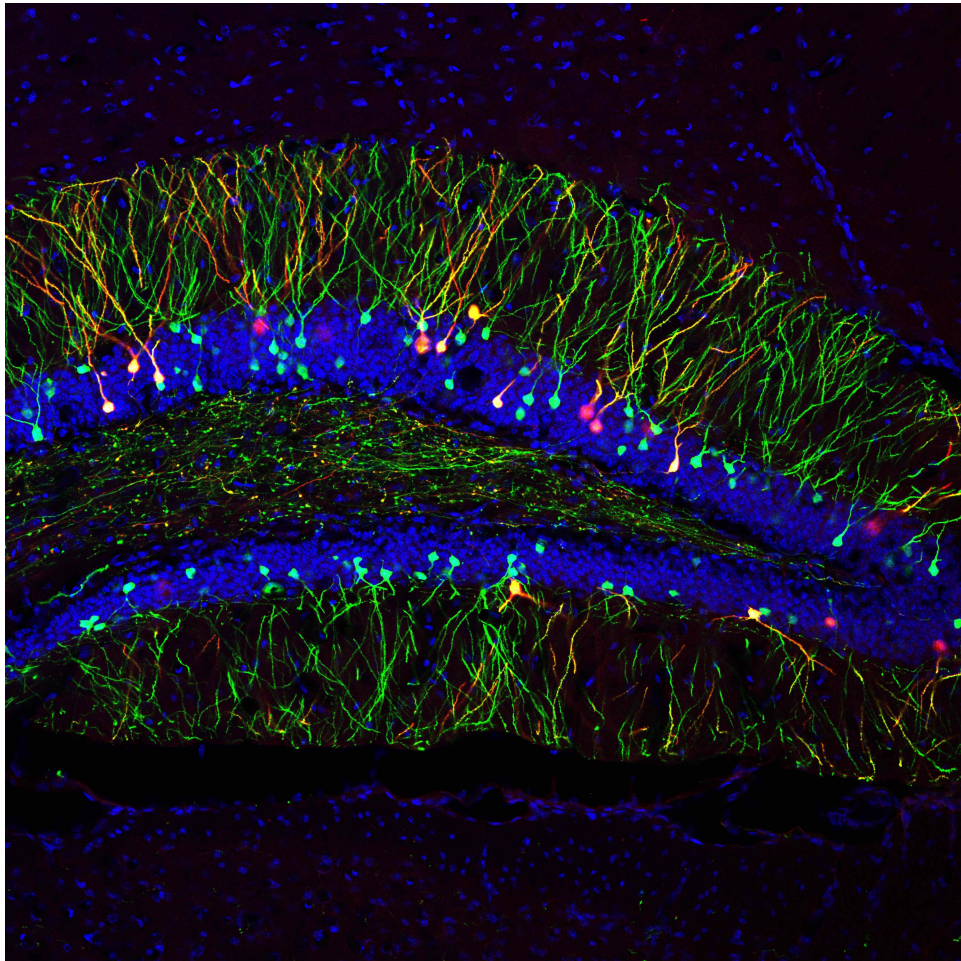


THE
NEUROSCIENCE INSTITUTE

UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

THEC Neuroscience Center of Excellence

Annual Report to the
Tennessee Higher Education Commission (THEC)
Fiscal year 2020 (7/1/2019-6/30/2020)



I. MISSION STATEMENT

The Neuroscience Institute 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 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 Neuroscience 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 Institute is available at: <https://www.uthsc.edu/neuroscience-institute/>

II. EXECUTIVE SUMMARY

In FY 2020 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 and Neurobiology Department in 2017; and (2) Dr. Il Hwan Kim, (see **Appendix 4**), an R01-funded assistant professor and social behavior neurobiologist recruited from Duke University into the Anatomy and Neurobiology Department in 2019. New start-up funding was allocated to a new faculty recruit, Dr. Jiangyan Du, an R01-funded associate professor and social behavior neurobiologist in the Anatomy and Neurobiology Department in January 2020. We provided stipend support to 3 graduate students, and have 14 students in the Neuroscience Track of the Integrated Biomedical Sciences Ph.D. program, after accepting 2 new students. We supported 13 postdocs in the Departments of Anatomy and Neurobiology, Neurology, Ophthalmology, Pharmacology and Physiology. We support a competitive pilot project award program, funding four projects to four UTHSC neuroscientists, Drs. Heck, Chizhikov, Cordero-Morales and Gangaraju. We promoted neuroscience research by providing the weekly Neuroscience Seminar series, mixing outside with UTHSC and affiliated faculty. Note that the impact of Covid cancelled the seminar series as of mid-March 2020 and also cancelled the undergraduate summer Neuroscience merit fellowship program as there was a moratorium on undergraduate students research at UTHSC during summer 2020. We supported the Neuroscience Imaging Center, a cost-recovery facility providing the only transmission electron microscope (JEOL 2000) on campus, a state of the art Zeiss 710 laser-line confocal microscope, and a Neurolucida 3-dimensional reconstruction workstation, and the Neuroscience Behavioral Core. Several pieces of core equipment were upgraded or replaced, including new Leica ultramicrotome and repairs to the Leica cryostat and the JEOL 2000. 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. Note that longstanding Director of NI, William Armstrong retired in August 2020 and Matthew Ennis, Ph.D., Chair of the Department of Anatomy and Neurobiology, was appointed as Interim Director and has contributed to this report.

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IV. ADMINISTRATIVE STRUCTURE

Director: Professor William E. Armstrong, Ph.D.
Department of Anatomy and Neurobiology

Co-Director: Professor Tony Reiner, Ph.D.
Department of Anatomy and Neurobiology

Administrative Specialist: Mistie Brewer

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

Neuroscience Executive Committee:

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

John Boughter, Ph.D., Professor, Department of Anatomy and Neurobiology

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

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

Tony Reiner, Ph.D., Professor and NI Co-Director, Department of Anatomy and Neurobiology

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

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/>

V. FACULTY OF THE NEUROSCIENCE INSTITUTE

The Neuroscience Institute is currently comprised of 76 faculty members in several different departments on the UTHSC campus, including those with primary appointments at St. Jude Children's Research Hospital and at the University of Memphis and Christian Brothers University, and one faculty member at UT Knoxville. Faculties are listed with each department; those with primary appointments outside UTHSC or UT K are so indicated. We added 2 new members (*) this past FY.

Department of Anatomy and Neurobiology

William E. Armstrong, Ph.D., Professor Emeritus and NI Director

Alessandra d'Azzo, Ph.D., Affiliated Professor (St. Jude)

John D. Boughter, Jr., Ph.D. Professor

Joseph C. Callaway, Ph.D., Associate Professor

Viktor Chizhikov, Ph.D., Associate Professor

*Jianyang Du, Ph.D., Associate Professor

Michael A. Dyer, Ph.D., Affiliated Professor (St. Jude)

Matthew Ennis, Ph.D., Simon R. Bruesch Professor and Chair

Max Fletcher, Ph.D., Associate Professor

Robert C. Foehring, Ph.D., Professor

Kristin Hamre, Ph.D., Associate Professor

Detlef Heck, Ph.D., Professor

Marcia G. Honig, Ph.D., Professor

Tauheed Ishrat, Ph.D., Associate Professor

Il Hwan Kim, Ph.D., Assistant Professor

Hitoshi Kita, Ph.D., Professor

Peter J. McKinnon, Ph.D., Affiliated Professor (St. Jude)

James I. Morgan, Ph.D., Affiliated Professor (St. Jude)

Anton J. Reiner, Ph.D., Methodist Professor and NI Co-Director

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

Steven L. Youngentob, Ph.D., Professor

Stanislav Zhakharenko, 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 Vleet Professor

Department of Medicine/Cardiology

Syamal Bhattacharya, Ph.D., Professor

Department of Neurology

Michael McDonald, Ph.D., Professor

Thaddeus S. Nowak, Ph.D., Professor

Lawrence T. Reiter, Ph.D., Professor

Jack Tsao, M.D., Ph.D., Professor

Department of Neurosurgery

Frederick Boop, M.D., Professor and Chair

Department of Ophthalmology

Rajashankar Gangaraju, Ph.D., Assistant Professor

Monica M. Jablonski, Ph.D., Professor

Nawajes Mandal, Ph.D., Associate Professor

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

Abbas Babajani-Feremi, Ph.D., Assistant Professor, Pediatrics, Le Bonheur

Joan Han, M.D., Associate Professor, Pediatrics, LeBonheur

Amy McGregor, M.D., Associate Professor, Pediatric Neurology, Le Bonheur

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 Vleet Professor and Chairman

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

Anna Bukiya, Ph.D. Associate Professor

Hao Chen, Ph.D., Associate Professor

Chang Hoon Jee, 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

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

Charles W. Leffler, Ph.D., Professor Emeritus

Helena Parfevona, Ph.D., Professor

Valeria Vásquez, Ph.D., Associate Professor

Paula Dietrich, Ph.D., Assistant Professor

Department of Preventive Medicine

Khyobeni Mozhui, Ph.D., Assistant Professor

College of Nursing

*Ansley Stanfill, Ph.D., Associate Professor

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

FY2020 Neuroscience Center of Excellence Annual Report

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 Integrated 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 Ethics. In addition, all graduate students must take the Neuroscience Seminar 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 with the exception of students working at St. Jude Children's Hospital, which provides their complete stipend. Currently the program has 14 students, four of whom are at St. Jude's, the others of whom are placed with mentors at UTHSC in Anatomy and Neurobiology, Neurology, Ophthalmology, Pharmacology and the College of Nursing.

In the last 5 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 recently graduated and left for postdocs. Ms. Baker continues PhD research with Dr. Kristen Hamre, and Angela Taylor with Dr. Detlef Heck, in Anatomy and Neurobiology. Financial details on support can be found in the budget. These are the *only* UTHSC students from the larger IBS program to have F31 fellowships.

Postdoctoral Fellows: The NI supports matching postdoctoral fellowships to some extent every calendar year, and successful postdocs can get support for a maximum of 2 years. In January of 2020, we had a call for applications for postdoctoral support (see **Appendix 4**) and awards were made on a competitive basis to the following 5 candidates with mentors in the Neuroscience Institute: Nikolai Fattakhov (Anatomy & Neurobiology, Dr. Victor Chizhikov), Kumar Jha (Ophthalmology, Dr. Raja Gangaraju), Seyed Hosseini (Ophthalmology, Dr. Monica Jablonski), Jungsoo Lee (Physiology, Dr. Valeria Vasquez), and Igor Iskusnykh (Anatomy & Neurobiology, Dr. Victor Chizhikov). Awardees were selected by the Neuroscience Executive Committee based on their productivity and promise in neuroscience research. 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 University of Tennessee Health Science Center's (UTHSC) Neuroscience Institute (NI), which is located within UTHSC's College of Medicine in Memphis, TN. Prof. William E. Armstrong is the Director, and Prof. Tony Reiner is the Co-Director. The Director reports to the Executive Dean of the College of Medicine at UTHSC, Scott Strome, M.D., and the Vice Chancellor of Research, Steven Goodman, 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, Oak Ridge National Laboratory, St. Jude Children's Hospital, and LeBonheur Children's Hospital.

Dr. Armstrong supervises Ms. Brandy Fleming, M.S., who is our Program Coordinator and also functions as our IT specialist. Ms. Fleming and Dr. Armstrong 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 Armstrong.

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 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), and Dr. William Armstrong has been director since 2006. Currently, Dr. Armstrong is Professor Emeritus and worked solely part-time as NI Director, on contract from Aug. 1, 2019-July 31, 2020. Dr. Matthew Ennis, Chair of the Department of Anatomy and Neurobiology, was selected as NI Interim Director by UTHSC administration upon Dr. Armstrong's retirement.

The program brings together neuroscience faculty members from the Departments of Anatomy and Neurobiology, Medicine, Molecular Sciences, Neurology, Neurosurgery, Ophthalmology, Pathology, Pediatrics, Pharmaceutical Sciences, Pharmacology, Physiology, Psychiatry, and Surgery, and in 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 microscopes, 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. 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, 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
A. Babajani-Feremi	Ped. 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
J. Tsao	Neurology	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. Gangaraju	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	S. Youngentob	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
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M. Dyer	Anatomy & Neurobiology	A. Reiner	Anatomy & Neurobiology
M. Jablonski	Ophthalmology	R. Williams	Genetics, Gen. Inform.
N. Mandal	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
J. Han	Pediatrics	M. Honig	Anatomy & Neurobiology
M. Mulligan	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	I. Kim	Anatomy & Neurobiology
A. Reiner	Anatomy & Neurobiology	S. Youngentob	Anatomy & Neurobiology
M. Mulligan	Genetics, Gen. Inform.	L. Schwarcz	Anatomy & Neurobiology
J. Du	Anatomy & Neurobiology		

ACCOMPLISHMENTS

Faculty support and recruitment: NI is currently disseminating funds to Dr. Tauheed Ishrat (\$150,000). Dr. Ishrat started drawing on his funds in February of 2018 and will have until February 2023 to spend the \$150,000. Dr. Ishrat came in as an associate professor, and also has an R01. He has submitted a second R01 which is pending review. He is a stroke neurobiologist and is interested in factors that mitigate or exacerbate stroke susceptibility in a focal ischemia model. NI also awarded Dr. Il Hwan Kim (see **Appendix 4**) \$150,000 to be

spent over 5 years. Dr. Kim's R01 funded research area is social behavior and schizophrenia. He has applied for Searle and McKnight foundation grants and is working towards a second R01. In FY 2020, we successfully recruited Dr. Jianyang Du from the University of Toledo, who arrived in 2020 with an R01 in the Department of Anatomy and Neurobiology. Dr. Du's funded research investigates social behavior and autism and he is working towards a second R01 in this area. NI awarded him \$100,000 toward his start-up fund package, to be spent over 5 years.

Acquisition of Equipment for Cores: In the past, NI has contributed matching funds for multi-user equipment grants, including those obtained from NIH for an electron microscope, for two confocal microscopes, for a computerized light microscope for three-dimensional neuronal reconstructions, and a high resolution digital camera attachment for the electron microscope, all are located in the Neuroscience Imaging Core and are maintained and supervised by a dedicated Technical Manager (Dr. Esther Marquez Wilkins) provided by the NI. This past year we renewed our service agreements for this imaging equipment. We also installed and operationalized the super resolution Airyscan scanner (purchased in FY2019 with partnering funds from the Chancellor's Office) addition to our Zeiss 710 confocal, allowing users to choose between the high resolution scanner and the more conventional 710 scanner. 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.

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 FY2020 we spent \$32,816 on matching stipends, and another \$1500 on travel support. Note that the impact of Covid since March 2020 cancelled travel to many meetings that otherwise would have been supported by NI. We currently have 14 Neuroscience students, including 2 new students who entered in the Fall of 2019. Recruiting efforts for Fall 2020 will bring in 7 new graduate students. Our recruiting flyer can be found at the end of **Appendix 4**, but through querying students, we find that most discover the program based on the NI Web site.

Postdoctoral Research Awards. The NI provided matching funds on a competitive basis for 13 postdoctoral fellows or research associates for FY 2020 (this includes those awarded in the previous calendar year). These awards range from \$10,000-\$15,000 each and totaled \$114,419. The 5 postdocs newly awarded in 2020 were located in the Departments of Anatomy and Neurobiology, Ophthalmology and Physiology. Their names are listed above under item VI.

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

neuroscience faculty and students and brings outstanding neuroscientists from around the world to the UTHSC campus. During the 2019-2020 academic year, the NI sponsored the weekly Neuroscience Seminar Series, hosting 17 speakers, 14 from outside and 3 from Memphis. Scheduled seminars from mid-March to June were cancelled due to Covid. The NI seminar series serves as the basis for a graduate course, Neuroscience Seminar (ANAT 821), which is attended by all neuroscience track IPBS graduate students and within which they read papers by and meet with the visiting scientists (course director Tauheed Ishrat, A & N, co-director, Kazuko Sakata, Pharmacology). 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 assists in the Spring Student Seminar course (course director Max Fletcher), where students give seminars and receive critical feedback from their colleagues. A complete list of FY 2019-2020 seminar speakers and their topics are provided in **Appendix 3**. NI partnered with the UTHSC Graduate Student Executive Council for honorarium for one of the speakers at the 2019 UTHSC Biomedical Symposium, “Pathway to Discovery: From Basic Science to Translational Medicine” (**see Appendix 4**).

NI Sponsored Workshop: NI co-sponsored two imaging and neuroanatomy workshops in FY 2018-2019. No workshops or symposia were scheduled in the current reporting period due to Covid.

Undergraduate Neuroscience Merit Scholarships: These are given to outstanding undergraduates at Rhodes College, Christian Brothers University (CBU) and University of Memphis. The Rhodes and CBU scholars work on independent projects for their undergraduate thesis. The scholars (and mentors) for summer 2019 (including the first few months of this reporting period, July-August) were: Matthew Scott, Christian Brothers University (Mentor, Dr. Kristin Hamre), Andrew Liess, Rhodes College (Mentor, Dr. Larry Reiter), Priya Yelemali, Rhodes College (Mentor, Dr. Shalini Narayana), and Anurag Epparala, Vanderbilt University (Mentor, Dr. Thiru Vaithianathan). We spent \$14,312 supporting these and 4 additional scholarships in the summer of 2019 (after July 1, 2019, so part of FY2020. New scholars are picked every Spring but UTHSC imposed a moratorium on undergraduate student research on campus in the summer of 2020 due to Covid.

VIII. GOALS AND FUTURE PLANS

Faculty Support and Recruitment: 1) We were given permission in 2017 by Interim College of Medicine Steven Schwab, and continued approval under the new College of Medicine Dean Dr. Strome, to recruit two mid-level neuroscientists into the Department of Anatomy and Neurobiology. Chair of Anatomy and Neurobiology, Dr. Matthew Ennis, and Dr. Armstrong co-chaired the search committees for these recruitments. This resulted in the recruitments of Dr. Il Hwan Kim of Duke University in 2019, and in FY 2019-2020, of Dr. Jiangyang Du from University of Toledo. NI partnered on both of their start-up funds.

Core Support: NI will continue to support the Imaging Center (including Microtomy lab), and Behavioral Core. This requires collecting and processing user fees, paying service contracts, and repairing/replacing equipment. Further Details are found in the budget for FY 2020 below. It is likely that we will need to replace several pieces of core equipment that are beyond their lifespan and have been under constant repair, e.g., cryostat, glass knife maker, obsolete computers used to run imaging workstations.

Graduate Student Support and Recruiting: We will recruit 7 new students into the Neuroscience Track for Fall of 2020. These interviews ran from January-March of 2020. We will continue with ongoing support of 5 students during the next fiscal year beginning July 1, 2020. Dr. Fletcher will run the Neuroscience Student Symposium class with Drs. Ennis and Heck assisting, and Drs. Sakata and Kim 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 5 postdocs. Requests for applications for support in 2020-2021 will be sent out in November 2020 for a January 2021 start date. These applications are competitive, and ranked by the NI Executive Committee. See Budget for FY 2021 for further details.

NI Neuroscience Seminar Series and Symposia: We will continue to run the Neuroscience Seminar Series, which due to the impact of Covid, was converted to an on-line Zoom seminar series in Fall of 2020. It is likely this will continue for the foreseeable future until health and travel issues caused by the pandemic are mitigated. Likewise, a similar situation applied to symposia and workshops normally sponsored or co-sponsored by NI.

Undergraduate Research Fellows: We will support up to 4 undergraduate research fellows from Rhodes College, Christian Brothers University, or University of Memphis. If the restrictions on undergraduate research on the campus imposed by Covid are lifted, applications will be processed in the Spring of 2021.

IX. BUDGET (see Schedule 7, page 21)

A. FY 2020. The FY 2020 THEC appropriated budget for the UTNI was \$622,613. We carried forward \$365,940 from the previous year for a total budget of \$988,553. 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 seed packages (Drs. Ishrat, Du, and Kim) and any unspent funds from research award accounts. Additionally, the carryforward reflects funds for seminar arrangements (travel, per diem, hotel and honorarium) that were not expended since mid-March due to Covid. Also, catering for the Student Symposium series did not occur due to

similar restrictions of group gathering on campus.

This past FY, we expended \$447,793 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 $\frac{3}{4}$ 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 3 graduate stipends to PIs with Neuroscience track graduate students for a total \$32,816. The mentors were located in the departments of Neurology and Anatomy and Neurobiology.

Postdoctoral Support: We provided matching funds for 13 postdoctoral fellows, for a total \$114,419. The NI Mentors are located in the departments of Anatomy and Neurobiology, Neurology, Ophthalmology, Pharmacology, and Physiology.

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 confocal microscope, and the Neurolucida workstation. This year our cost-recovery program took in \$20,538 which was used against the fees needed to pay the service contracts on the Zeiss 710 (\$22,690) and the JEOL 2000 (\$16,800). In addition we recently paid \$67,500 on the Airyscan high resolution upgrade to the Zeiss 710. The cost recovery this FY was much less than previous years due to the restricted research operations during Covid-19.

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 (PIs provide their own technicians to use the equipment), NI has not yet instituted fees for services in this facility.

Neuroscience Microtomy Core: The equipment available for use can be viewed at: <https://www.uthsc.edu/neuroscience-institute/facilities/imaging-center.php>.

Seminars and Symposia: Additional funds went to support travel/lodging/meals (\$13,490) and honoraria (\$1600), for the Neuroscience Seminar series (see **Appendix 3**).

Research Projects: We provided startup funds for Drs. Ishrat, Du, and Kim, who were awarded \$150,000, \$100,000 and \$150,000, respectively. Dr. Ishrat's began in February of 2018 and Drs. Du and Kim's began in

April 2020. These can be spread over the next 3-5 years. We also sent out a request in February 2020 for research support grants (**see Appendix 4**). We awarded 5 of those grants between \$25,000-\$50,000. Those receiving the awards were: Drs. Heck (\$50,000), Chizhikov (\$30,000), Cordero-Morales (\$35,700) and Gangaraju (\$25,695). Any unspent funds are reflected in our carryover.

Undergraduate Fellowships: NI supported 4 undergraduate Neuroscience Merit Fellows at \$3000-4000 each (total, \$14,312) for summer research.

Travel Awards: \$2245 in travel awards for graduate students and postdoctoral fellows were awarded.

B. FY 2021. We will carryover \$283,309 to the coming fiscal year, and have been appropriated \$623,823 for a total of \$907,132. 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 FY2021:

Students: For the coming year, we have awarded matching, or partial support, funds for 5 graduate stipends to PIs with Neuroscience track graduate students. Mentors are located in the departments of Anatomy and Neurobiology and Nursing. The NI match is ~\$14,500 each for 5 of these making an expected total of ~\$72,500.

Postdoctoral Support: We continued to provide funds for 5 postdoctoral fellows (\$10,000-15,000 each for a total of ~\$35,000 for the coming year). Some can be given to awardees from last year assuming good progress, with a maximum of 2 year's support. In addition, we have allotted another \$40,000 for 5 new postdoctoral fellows, bringing the total expected postdoctoral expenditures to \$75,000 during FY 2021.

Neuroscience Imaging Center: We will pay the service contracts on the JEOL 2000 (\$16,800) and the Zeiss 710 Confocal (\$22,689). Our Microbrightfield contract for the NeuroLucida workstation will be renewed at \$4000. Computers for the NeuroLucida system and the Zen Workstation are no longer compatible with internet access and the latest operating systems and will need to be replaced. We will also upgrade and add to the Imaris image analysis software.

Neuroscience Behavioral Core: We will continue to support the Behavioral Core in FY2021, but expenditures are expected to be minimal. 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.

Neuroscience Microtomy Core: Currently we have no contracts for any of the Microtomy Core equipment. We will likely have to upgrade the Leica cryostat and glass blade maker in the Microtomy core, either by purchasing a used one or investing in significant repair.

NI Faculty: We will provide administrative supplements to Drs. Ennis and Reiner. We are currently providing \$150,000 over 3-5 years to faculty member Dr. Tauheed Ishrat (2/01//2018-1/31/2023), and have committed \$150,000 to a new recruit, Il Hwan Kim, Ph.D., over 3-5 years. Dr. Kim arrived in February of 2019 so his support will run until 2024 should he choose to spread it over the full 5 years. 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. In addition, we are obligated for another \$100,000 to new recruit Dr. Du who arrived in January of 2020. His support will run until 2025 should he choose to spread it over the full 5 years.

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

Seminar Series and Community Outreach: We will offer our weekly Neuroscience Seminar series, currently offered on-line and featuring local speakers. If conditions permit, 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 3-4 awards, depending on qualifications).

Impact of Covid. As the Covid Pandemic continues, we anticipate that funds allocated to the Seminar Series and Undergraduate Fellowships may not be expended or fully expended in the upcoming fiscal period. Unspent funds in these categories will allow us to fully fund 50,000/year in faculty start-up packages and also to repair or replace core equipment in the Imaging Center.

Schedule 7

CENTERS OF EXCELLENCE ACTUAL, PROPOSED, AND REQUESTED BUDGET

Institution: **UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER** Center: **NEUROSCIENCE-In Total**

	FY 2019-20 Actual			FY 2020-21 Proposed			FY 2021-22 Requested		
	Matching	Approp.	Total	Matching	Approp.	Total	Matching	Approp.	Total
Expenditures									
Salaries									
Faculty	\$203,060	\$47,849	\$250,909	\$186,565	\$20,000	\$206,565	\$192,162	\$25,000	\$217,162
Other Professional	101,040	184,660	285,700	77,199	254,845	332,044	58,465	61,000	119,465
Clerical/ Supporting	236,811	28,588	265,399	185,888	35,000	220,888	191,465	36,000	227,465
Assistantships	308,961	108,179	417,140	312,558	100,000	412,558	321,935	105,000	426,935
Total Salaries (Excluding Longevity)	\$849,872	\$369,276	\$1,219,148	\$762,210	\$409,845	\$1,172,055	\$764,026	\$227,000	\$991,026
Longevity (Exclude from Salaries)	\$6,753	\$7,432	\$14,185	\$6,956	\$8,000	\$14,956	\$7,164	\$9,000	\$16,164
Fringe Benefits	172,615	98,588	271,203	168,015	85,720	253,735	172,972	90,820	263,792
Total Personnel	\$1,029,240	\$475,295	\$1,504,535	\$937,181	\$503,565	\$1,440,746	\$944,163	\$326,820	\$1,270,983
Non-Personnel									
Travel	\$0	\$10,997	\$10,997	\$0	\$14,000	\$14,000	\$0	\$14,420	\$14,420
Software	0	0	0	0	0	0	0	0	0
Books & Journals	0	0	0	0	0	0	0	0	0
Other Supplies	0	56,653	56,653	0	226,267	226,267	0	174,575	174,575
Equipment	0	122,115	122,115	0	100,000	100,000	0	74,000	74,000
Maintenance	0	47,909	47,909	0	67,000	67,000	0	69,010	69,010
Scholarships	0	0	0	0	0	0	0	0	0
Consultants	0	0	0	0	0	0	0	0	0
Renovation	0	0	0	0	0	0	0	0	0
Other (Specify):		0							0
Media Processing	0	54	54	0	500	500	0	515	515
Communication	0	1,479	1,479	0	1,000	1,000	0	1,030	1,030
Rentals & Insurance	0	2,706	2,706	0	2,800	2,800	0	2,884	2,884
Insurance & Interest	0	1,558	1,558	0	2,000	2,000	0	2,060	2,060
Contractual & Special Services	0	4,724	4,724	0	5,000	5,000	0	5,150	5,150
Other Services & Expenditures	0	0	0	0	0	0	0	0	0
Other Expenses	0	-17,819	-17,819	0	-15,000	-15,000	0	-15,450	-15,450
Direct Cost Sharing	0	-427	-427	0	0	0	0	0	0
Total Non-Personnel	\$0	\$229,948	\$229,948	\$0	\$403,567	\$403,567	\$0	\$328,194	\$328,194
GRAND TOTAL	\$1,029,240	\$705,243	\$1,734,483	\$937,181	\$907,132	\$1,844,313	\$944,163	\$655,014	\$1,599,177
Revenue									
New State Appropriation	\$0	\$622,613	\$622,613	\$0	\$623,823	\$623,823	\$0	\$655,014	\$655,014
Carryover State Appropriation	0	365,940	365,940	0	283,309	283,309	0	0	0
New Matching Funds	927,540	0	927,540	986,081	0	986,081	922,963	0	922,963
Carryover from Previous Matching Funds	0	0	0	0	0	0	0	0	0
Total Revenue	\$927,540	\$988,553	\$1,916,093	\$986,081	\$907,132	\$1,893,213	\$922,963	\$655,014	\$1,577,977

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 153 papers!**

XI. EXTRAMURAL FUNDING OF NEUROSCIENCE FACULTY

The UT Neuroscience Institute is a concentrated, interdepartmental Neuroscience program. For FY2019-2020, Anatomy and Neurobiology (11 funded Neuroscientists) was ranked **22nd in the category of Neuroscience departments among public university medical schools in NIH funding (39th overall), and 29th among public university Anatomy and Cell Biology Departments (45th overall)**. (Statistics from Blue Ridge Institute for Medical Research (http://www.brimr.org/NIH_Awards/2019/NIH_Awards_2019.htm)). The total annual grant dollars (total costs) currently held by faculty associated with the NI at UTHSC (*i.e.*, excluding affiliate members, such as St. Jude, and excluding grants in no cost extensions) is **\$18,858,802, an increase of nearly one million from last year!** The research grants (current year total costs) currently held by individual faculty of the NI 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 grants recently awarded to NI faculty.

APPENDIX 1
External Funding of Neuroscience Institute Faculty
FY 2019-2020

FY2020 Neuroscience Center of Excellence Annual Report

Lead PI	Department	Project Title	Sponsor	Award Number	Begin Date	End Date	Total Amount
Baker, Jessica	Anatomy and Neurobiology	Evaluation of the genetic contribution of the neuroinflammatory response following neonatal alcohol exposure	HHS - NIH - NIAAA - National Institute on Alcohol Abuse and Alcoholism	1F31AA026498-03	12/1/2019	11/30/2020	\$36,020
Baker, Jessica	Anatomy and Neurobiology	Evaluation of the genetic contribution of the neuroinflammatory response following neonatal alcohol exposure	HHS - NIH - NIAAA - National Institute on Alcohol Abuse and Alcoholism	1F31AA026498-03 Revised	12/1/2019	11/30/2020	\$504
Boughter, John *Fletcher, Max	Anatomy and Neurobiology	Spatial taste coding in mouse gustatory cortex	HHS - NIH - NIDCD - National Institute on Deafness and Other	1R01DC016833-03	5/1/2020	4/30/2021	\$379,687
Bukiya, Anna	Pharmacology	Fatty acid and alcohol modulation of cerebral artery diameter	HHS - NIH - NIAAA - National Institute on Alcohol Abuse and Alcoholism	1R03AA028380-01	5/1/2020	4/30/2021	\$76,000
Chen, Hao *Mulligan, Megan	Pharmacology	Reduced complexity mapping of oxycodone self-administration and stress responsiveness in rats	HHS - NIH - NIDA - National Institute on Drug	1R01DA048017-01A1	5/1/2020	2/28/2021	\$358,934
Chen, Hao *Williams, Robert	Pharmacology	System genetics of menthol and nicotine addiction	HHS - NIH - NIDA - National Institute on Drug	1U01DA047638-02	1/1/2020	12/31/2020	\$657,354
Chizhikov, Viktor	Anatomy and Neurobiology	Mesenchymal-neuroepithelial interactions in the developing telencephalon.	HHS - NIH - NINDS - National Institute of Neurological Disorders and	5R01NS093009-05	6/1/2020	5/31/2021	\$332,604
Cordero-Morales, Julio	Physiology	The Role of Bioactive Lipids in Transient Receptor Potential Channels Gating	HHS - NIH - NIGMS - National Institute of General Medical Sciences	1R01GM125629-03	1/1/2020	12/31/2020	\$273,600
Cordero-Morales, Julio	Physiology	The Role of Bioactive Lipids in Transient Receptor Potential Channels Gating	HHS - NIH - NIGMS - National Institute of General Medical Sciences	1R01GM125629-03 REVISED	1/1/2020	12/31/2020	\$30,400
Dopico, Alejandro	Pharmacology	Regulation of arterial diameter through specific sensing of endogenous steroids and novel nonsteroidal analogs by BK channel	HHS - NIH - NHLBI - National Heart, Lung, and	1R01HL147315-02	2/1/2020	1/31/2021	\$599,700
Dragatsis, Ioannis	Physiology	Cholesterol and sonic hedgehog signaling in alobar holoprosencephaly	HHS - NIH - NINDS - National Institute of Neurological Disorders and	1R21NS111097-02	3/2/2020	2/28/2021	\$228,000
Dragatsis, Ioannis	Physiology	Genetic restoration of IKAP as a tool to study Familial Dysautonomia	HHS - NIH - NINDS - National Institute of Neurological Disorders and	1R21NS112989-02	6/1/2020	5/31/2021	\$190,000
Du, Jianyang	Anatomy and Neurobiology	CO2 inhalation enhances the lability of fear memory.	HHS - NIH - NIMH - National Institute of Mental	7R01MH113986-03	5/1/2020	4/30/2021	\$348,489
Foehring, Robert	Anatomy and Neurobiology	Dynamics of Kv channel function in identified populations of pyramidal neurons in neocortex	HHS - NIH - NINDS - National Institute of Neurological Disorders and	2R01NS044163-16	2/1/2020	1/31/2021	\$466,986
Hamre, Kristin	Anatomy and Neurobiology	Maternal genotype, choline intervention, & epigenetics in Fetal Alcohol Syndrome	HHS - NIH - NIAAA - National Institute on Alcohol Abuse and Alcoholism	5R01AA023508-05	3/1/2020	2/28/2021	\$296,166
Han, Joan	Pediatrics-Obesity	The Impact of Stress and Resilience on Obesity-Related Metabolic Complications in Adolescents	Texas A and M University (TAMU)	M2000377	6/30/2020	6/30/2021	\$22,601
Han, Joan	Pediatrics-Obesity	Salary support for Joan Han	Memphis Research		7/1/2019	6/30/2020	\$268,500
Han, Joan	Pediatrics-Obesity	Start-up Funds	Memphis Research		7/1/2019	6/30/2020	\$50,000
Han, Joan C	Pediatrics-Obesity	The Impact of Stress and Resilience on Obesity-Related Metabolic Complications in Adolescents	Texas A and M University (TAMU)	7R21DK113344-02	7/1/2019	6/30/2020	\$25,478
Han, Joan C	Pediatrics-Obesity	Subaward: Melanocortin agonist to bypass leptin resistance of	Jackson Laboratory	210260-0519-03 am3	6/1/2019	5/31/2020	\$30,400
Heck, Detlef	Anatomy and Neurobiology	Engrailed genes and cerebellum morphology, spatial gene expression and circuitry	Memorial Sloan Kettering Cancer Center	BD525235A	12/1/2019	11/30/2020	\$34,000
Heck, Detlef	Anatomy and Neurobiology	Neuronal mechanisms of cerebellar cognitive function	HHS - NIH - NIMH - National Institute of Mental	1R01MH112143-03	1/1/2020	12/31/2020	\$356,711
Heck, Detlef	Anatomy and Neurobiology	Neuronal mechanisms of cerebellar cognitive function	HHS - NIH - NIMH - National Institute of Mental	1R01MH112143-03 REVISED	1/1/2020	12/31/2020	\$39,635
Ishrat, Tauheed	Anatomy and Neurobiology	Mechanisms and therapeutic targets of neurovascular injury in hyperglycemic stroke	HHS - NIH - NINDS - National Institute of Neurological Disorders and	7R01NS097800-05	6/1/2020	5/31/2021	\$332,500
Jablonski, Monica	Ophthalmology	Extended Release Formulation of a New IOP Lowering Drug for Improved Treatment of Glaucoma	Oculotherapy	R34EY029909 20-0734-UTHSC	6/1/2019	5/31/2020	\$66,460
Jablonski, Monica	Ophthalmology	New ADM Models Mined from the BXD Family of Mice	Research to Prevent		7/1/2019	5/31/2020	\$150,000
Jablonski, Monica	Ophthalmology	Cellular Mechanisms of Pathological Retinal Neovascularization	HHS - NIH - NEI - National Eye Institute	1R01EY029709-02	5/1/2020	4/30/2021	\$380,000
Jablonski, Monica	Ophthalmology	Cellular Mechanisms of Pathological Retinal Neovascularization	HHS - NIH - NEI - National Eye Institute	1R01EY029709-02 REVISED	5/1/2020	5/31/2020	(\$179,158)
Jablonski, Monica	Ophthalmology	Novel Extended Release Glaucoma Therapy for Once Daily Dosing	HHS - NIH - NEI - National Eye Institute	1R24EY029950-01A1	3/1/2020	2/28/2021	\$1,137,678
Jablonski, Monica	Ophthalmology	Genetic Modulation of Glaucoma	HHS - NIH - NEI - National Eye Institute	2R01EY021200-06	2/1/2020	1/31/2021	\$378,431
Jaggar, Jonathan	Physiology	Blood pressure regulation by smooth muscle cell ion channels	HHS - NIH - NHLBI - National Heart, Lung, and	1R01HL133256-04	4/1/2020	3/31/2021	\$380,000
Jaggar, Jonathan	Physiology	Endothelial cell potassium channels	HHS - NIH - NHLBI - National Heart, Lung, and	1R01HL137745-03	7/1/2019	6/30/2020	\$490,268
Jee, Chang Hoon	Pharmacology	Center for Genetic Studies of Drug Abuse in Outbred Rats - Pilot: Cross-species functional validation of overlapping GWAS candidates between tobacco smoking in human and socially acquired nicotine	University of California, San Diego (UCSD)	127276513	11/15/2019	4/30/2020	\$25,000
Jiang, Jianxiong	Pharmaceutical Sciences	Inflammatory regulation of neurotrophin signaling in epileptogenesis	HHS - NIH - NINDS - National Institute of Neurological Disorders and	7R01NS100947-04	12/1/2019	11/30/2020	\$299,250
Jiang, Jianxiong	Pharmaceutical Sciences	Inflammatory regulation of neurotrophin signaling in epileptogenesis	HHS - NIH - NINDS - National Institute of Neurological Disorders and	7R01NS100947-04 REVISED	12/1/2019	11/30/2020	\$33,250
Jiang, Jianxiong	Pharmaceutical Sciences	Targeting Prostaglandin Receptor EP2 for Glioma and Associated Epilepsy	HHS - NIH - NINDS - National Institute of Neurological Disorders and	1R21NS109687-02	1/1/2020	12/31/2020	\$205,200
Jiang, Jianxiong	Pharmaceutical Sciences	Targeting Prostaglandin Receptor EP2 for Glioma and Associated Epilepsy	HHS - NIH - NINDS - National Institute of Neurological Disorders and	1R21NS109687-02 REVISED	1/1/2020	12/31/2020	\$22,800
Jiang, Jianxiong	Pharmaceutical Sciences	Prostaglandin signaling following seizures	HHS - NIH - NINDS - National Institute of Neurological Disorders and	7R00NS082379-06 REVISED	8/3/2018	6/30/2019	\$32,996
Kim, Il Hwan	Anatomy and Neurobiology	Genes, Neural Circuits and Behavior	HHS - NIH - NIMH - National Institute of Mental	1R01MH117429-02	5/1/2020	4/30/2021	\$386,063

FY2020 Neuroscience Center of Excellence Annual Report

Lead PI	Department	Project Title	Sponsor	Award Number	Begin Date	End Date	Total Amount
Li, Wei *Miller, Duane	College of pharmacy	Non-Veru 111 NCE Antitubulins	Veru Inc.		1/24/2020	1/23/2021	\$50,000
Li, Wei *Miller, Duane	Pharmaceutical Sciences	Targeting the colchicine site in tubulin for advanced melanoma	HHS - NIH - NCI - National Cancer Institute	5R01CA148706-10	1/1/2020	12/31/2020	\$328,942
Liao, Francesca-Fang	Pharmacology	Novel mechanistic link between metabolic changes and dementia potential role of miRNA21	HHS - NIH - NIA - National Institute on Aging	1RF1AG058467-03	6/1/2020	5/31/2021	\$547,034
Lu, Lu	Genetics, Genomics &	Systems genetics study of hearing loss	Binzhou University		11/1/2019	10/31/2020	\$40,000
Malik, Kafait	Pharmacology	Angiotensins, Prostaglandins, Adrenergic Interactions	HHS - NIH - NHLBI - National Heart, Lung, and	2R01HL019134-45	6/1/2020	5/31/2021	\$643,123
McDonald, Michael	Neurology	Effects of glycomacropptide on memory and Alzheimer-related neuropathology	HHS - NIH - NIA - National Institute on Aging	1R01AG054562-04	4/1/2020	3/31/2021	\$380,000
Miller, Duane	Pharmaceutical Sciences	Development of a dual MDM2/XIAP inhibitor with a high therapeutic index for childhood cancers	SEAK Therapeutics, LLC		9/15/2019	8/31/2020	\$20,500
Moore, Bob	Pharmaceutical Sciences	Development of selective cannabinoid receptor 2 (CB2) agonists	Applied Biological Materials		8/1/2019	7/31/2020	\$733,908
Narayana, Shalini	Pediatrics-Neurology	Consortium for Standardizing TMS Language Mapping Protocols and Establishing Best Practice Guidelines for Using TMS in	American Epilepsy Society (AES)		6/30/2020	7/31/2021	\$50,000
Nowak, Thaddeus	Neurology	Refining stroke QTLs in recombinant inbred BXD mice	HHS - NIH - NINDS - National Institute of Neurological Disorders and	1R03NS108997-02	7/1/2019	6/30/2020	\$76,000
Parfenova, Elena	Physiology	Endothelial Vasoprotection by Hypothermia	HHS - NIH - NINDS - National Institute of Neurological Disorders and	1R01NS105655-02	7/1/2019	6/30/2020	\$424,069
Parfenova, Elena	Physiology	Astrocyte functions in neonatal brain	HHS - NIH - NINDS - National Institute of Neurological Disorders and	1R01NS101717-03	7/1/2019	6/30/2020	\$332,500
Parfenova, Elena *Jaggar, Jonathan	Physiology	Endothelial Vasoprotection by Hypothermia	HHS - NIH - NINDS - National Institute of Neurological Disorders and	1R01NS105655-02	7/1/2019	6/30/2020	\$424,069
Pourcyrus, Massroor	Pediatrics-Neonatology	NON-OPIATE TREATMENT AFTER PRENATAL OPIATE EXPOSURE TO PREVENTPOSTNATALINJURY TO THE YOUNG BRAIN (NO-	University of Kentucky (UK)	3200001244-20-024	5/1/2019	2/28/2020	\$13,028
Pourcyrus, Massroor	Pediatrics-Neonatology	NON-OPIATE TREATMENT AFTER PRENATAL OPIATE EXPOSURE TO PREVENTPOSTNATALINJURY TO THE YOUNG BRAIN (NO-	University of Kentucky (UK)	3200001244-20-024	3/1/2020	2/28/2021	\$12,872
Quarles, Leigh *Lu, Lu	Medicine-nephrology	Genetic and Environmental Determinants of GPRC6A Regulation of Energy Metabolism Using Genetically Engineered Mice and Systems Biology.	HHS - NIH - NIDDK - National Institute of Diabetes and Digestive and Kidney	1R01DK120567-01A1	1/1/2020	12/31/2020	\$495,854
Reiner, Anton	Anatomy and Neurobiology	Neural Control of Choroidal Blood Flow in the Eye	HHS - NIH - NEI - National Eye Institute	5 R01 EY005298-30	9/1/2019	8/31/2020	\$380,000
Reiter, Larry	Neurology	Evaluating endosomal recycling pathways in primary neurons from PWS individuals	St Jude Children's Research Hospital	182048010-7895322	9/1/2019	8/31/2020	\$50,000
Reiter, Larry	Neurology	Assessment of epigenetic driven circadian rhythm defects in neurons from individuals with PWS	Foundation for Prader -Willi Research		5/1/2020	4/30/2021	\$97,200
Reiter, Larry	Neurology	Rapid-onset Obesity with Hypothalamic dysfunction, Hypoventilation, & Autonomic Dysregulation (ROHHAD): Dental Pulp Stem Cell-Derived Models to Investigate Cause &	Ann and Robert H. Lurie Children's Hospital of Chicago	#A20-0041-S002	10/25/2019	10/24/2020	\$38,003
Reiter, Larry	Neurology	Construction of a PWS subtype DPSC neuron panel for research purposes	Foundation for Prader -Willi Research		2/1/2020	1/31/2021	\$32,400
Sakata, Kazuko	Pharmacology	Heat shock factor HSF1 regulation of promoter-specific BDNF transcription	HHS - NIH - NINDS - National Institute of Neurological Disorders and	1R21NS101703-02	7/1/2019	6/30/2020	\$190,000
Stanfill, Ansley	Nursing-Research Programs	A multivariate predictive model for long-term disability post subarachnoid hemorrhage in Caucasian and African American	HHS - NIH - NINR - National Institute of Nursing	1R01NR017407-02S1	8/1/2019	7/31/2020	\$61,745
Stanfill, Ansley	Nursing-Research Programs	A multivariate predictive model for long-term disability post subarachnoid hemorrhage in Caucasian and African American	HHS - NIH - NINR - National Institute of Nursing	1R01NR017407-02	8/1/2019	7/31/2020	\$503,594
Taylor, Angela	Anatomy and Neurobiology	Role of cerebro-cerebellar circuits in cognition	HHS - NIH - NIMH - National Institute of Mental	1F31MH122068-01	1/1/2020	12/31/2020	\$45,016
Towbin, Jeffrey Allen *Lu, Lu	Pediatrics-Cardiology	Discovery of modifier genes in cardiomyopathy	HHS - NIH - NHLBI - National Heart, Lung, and	1R01HL151438-01	4/1/2020	3/31/2021	\$629,555
Tsao, Jack	Neurology	Does Military Traumatic Brain Injury Increase the Risk for Developing Early Onset Dementia and Mild Cognitive Impairment?	DOD - Department of Defense	W81XWH1910868	9/30/2019	9/29/2020	\$283,458
Tsao, Jack	Neurology	Analysis of blood biomarkers of Alzheimer's and other dementias following traumatic brain injury and/or blast exposure in military personnel	HHS - NIH - NINDS - National Institute of Neurological Disorders and	1R21NS110410-02	5/1/2020	4/30/2021	\$236,120
Tsao, Jack *Waters, Robert	Neurology	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	1R01HD094588-02	7/1/2019	6/30/2020	\$588,299
Vasquez, Valeria	Physiology	Regulation of mechanosensitive ion channels by membrane lipids.	HHS - NIH - NIGMS - National Institute of General Medical Sciences	1R01GM133845-01	8/1/2019	6/30/2020	\$326,800
Williams, Robert	Genetics, Genomics &	Systems Control of Normal Aging and Alzheimer's Disease	Jackson Laboratory	Am3 5R01AG054180-	5/1/2020	4/30/2021	\$18,822
Williams, Robert	Genetics, Genomics & Informati	NIDA Core	HHS - NIH - NIDA - National Institute on Drug	1P30DA044223-04	6/1/2020	5/31/2021	\$754,121
Williams, Robert	Genetics, Genomics & Informati	A Unified High Performance Web Service for Systems Genetics and Precision Medicine	HHS - NIH - CSR - National Center for Scientific Review	1R01GTM123489-04	4/1/2020	3/31/2021	\$476,764
Zhou, Fuming	Pharmacology	Ion channel mechanisms of striatal dopaminergic motor stimulation	HHS - NIH - NINDS - National Institute of Neurological Disorders and	5R01NS097671-05	5/1/2020	4/30/2021	\$332,500
TOTAL							\$18,858,802

APPENDIX 2
Faculty Publications (PubMed)
FY 2019-2020

Peer-reviewed publications for 2019-2020 (cited in PubMed):

- Abidi, A. H., Alghamdi, S. S., Dabbous, M. K., Tipton, D. A., Mustafa, S. M., & **Moore, B. M.** (2020). Cannabinoid type-2 receptor agonist, inverse agonist, and anandamide regulation of inflammatory responses in IL-1beta stimulated primary human periodontal ligament fibroblasts. *J Periodontal Res*, 55(5), 762-783. doi:10.1111/jre.12765
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- Ahmed, H. A., & **Ishrat, T.** (2020). The Brain AT2R-a Potential Target for Therapy in Alzheimer's Disease and Vascular Cognitive Impairment: a Comprehensive Review of Clinical and Experimental Therapeutics. *Mol Neurobiol*, 57(8), 3458-3484. doi:10.1007/s12035-020-01964-9
- Allen, R. P., Earley, C. J., **Jones, B. C.**, & Unger, E. L. (2020). Iron-deficiency and dopaminergic treatment effects on RLS-Like behaviors of an animal model with the brain iron deficiency pattern of the restless legs syndrome. *Sleep Med*, 71, 141-148. doi:10.1016/j.sleep.2020.01.024
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- Babajani-Feremi, A.**, Fulton, S. P., Holder, C. M., Choudhri, A. F., **Boop, F. A.**, & **Wheless, J. W.** (2019). Localization of Expressive Language Cortex in a 2-Year-Old Child Using High-Gamma Electrooculography. *J Child Neurol*, 34(13), 837-841. doi:10.1177/0883073819863999
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APPENDIX 3
Neuroscience Seminar Speakers
FY 2019-2020



THE
NEUROSCIENCE INSTITUTE
UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

NEUROSCIENCE SEMINAR SERIES SCHEDULE

Fall 2019

James Schwob, M.D., Ph.D. September 10, 2019
Professor, Department of Developmental, Molecular & Chemical Biology
Tufts University
Host: Dr. Steven Youngentob

Title: How to Fix a Broken Nose: Neurogenesis and It's Regulation in the Olfactory Epithelium

Eishi Asano, M.D., Ph.D. September 17, 2019
Professor, Department of Pediatrics & Neurology
Children's Hospital of Michigan
Host: Dr. Abbas Babajani-Feremi

Title: Movie of the Human Brain

Steven Fliesler, Ph.D. September 24, 2019
SUNY Distinguished Professor, Department of Ophthalmology
University of Buffalo
Host: Dr. Anton Reiner

Title: Cholesterol in the Retina: Twists and Turns of Biology and Pathology

Chris Ford, Ph.D. October 1, 2019
Associate Professor, Department of Pharmacology
University of Colorado
Host: Dr. Fu-Ming Zhou

Title: Encoding Dopamine Signals in Striatal Circuits

Jeff Tasker, Ph.D.

October 8, 2019

Professor, Department of Cell & Molecular Biology

Tulane University

Host: Dr. William Armstrong

Title: Neuronal-glia Signaling and Stress Plasticity of the Noradrenergic Activation of Hypothalamic CRH Neurons

Gregory Bix, M.D., Ph.D.

October 15, 2019

Professor and Vice Chair of Clinical and Translational Research, Department of Neurosurgery

Tulane University

Host: Dr. Tauheed Ishrat

Title: Enter the Matrix: Novel Therapeutic Targets for Ischemic Stroke and Vascular Dementia

Lawrence Reiter, Ph.D.

October 29, 2019

Professor, Department of Neurology

UTHSC

Title: TBA

Scott Soderling, Ph.D.

November 5, 2019

Chair of Cell Biology, Professor of Neurobiology

Duke University

Host: Graduate Students

Title: TBA

Long-Jun Wu, Ph.D.

November 12, 2019

Associate Professor, Mayo School of Medicine, Assistant Professor, Department of Neurobiology

Rutgers University

Host: Dr. Jianxiang Jiang

Title: Neuroimmune Interaction in Normal and Diseased Brain

Daniel Stamer, Ph.D.

November 19, 2019

Professor, Department of Ophthalmology & Biomedical Engineering

Duke University

Host: Dr. Nawajes Mandal

Title: TBA

Anthony Grace, Ph.D.

December 3, 2019

Distinguished Professor, Department of Neuroscience, Psychiatry & Psychology

University of Pittsburgh

Host: Dr. Byron Jones

Title: TBA

Changhoon Jee, Ph.D.

December 10, 2019

Assistant Professor, Department of Pharmacology

UTHSC

Title: TBA



THE
NEUROSCIENCE INSTITUTE
UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

NEUROSCIENCE SEMINAR SERIES SCHEDULE

Spring 2020

Fu-Ming Zhou, Ph.D.

January 28, 2020

Professor, Department of Pharmacology
UTHSC

Title: Dopamine, the Inwardly Rectifying Potassium Channel and Parkinson's Disease

Avtar Roopra, Ph.D.

February 4, 2020

Associate Professor, Department of Neuroscience
University of Wisconsin-Madison
Host: Dr. Jianxiong Jiang

Title: A Systems Approach to Study Problems in Epilepsy: A Kind of MAGIC

Peter Tsai, MD, Ph.D.

February 11, 2020

Assistant Professor, Department of Neurology and Neurotherapeutics,
Neuroscience, Pediatrics, Psychiatry, Center for Autism and Developmental
Disabilities
University of Texas Southwestern Medical Center
Host: Dr. Detlef Heck

Title: Autism and the Little Brain: Cerebellar Circuits in ASD

Xinglong Wang, Ph.D.

March 3, 2020

Associate Professor of Pathology
Case Western Research University

Title: Mitochondrial Modulation of Synaptic Elimination at the Neuromuscular Junction

Kazutoshi Nakazawa, M.D., Ph.D. March 10, 2020
Fellow, Department of Neuroscience, Southern Research
Adjunct Associate Professor, Department of Neurobiology
University of Alabama at Birmingham
Host: Dr. Kazuko Sataka

Title: NMDA receptor hypofunction in interneurons and schizophrenia

Jiaqian Wu, Ph.D. CANCELLED March 17, 2020
Associate Professor, Department of Neurosurgery
Institute of Molecular Medicine
University of Texas Health Science Center Houston
Host: Dr. Francesca-Fang Liao

Title: Integrative Analysis of Long Noncoding RNA and Transcription Factor Regulation in Neural Cell Fate and Spinal Cord Injury

David Antonetti, Ph.D. CANCELLED March 24, 2020
Roger W. Kittendorf Research Professor of Ophthalmology and Visual Sciences
Kellogg Eye Center
Host: Dr. Raja Gangaraju

Title: TBA

Vitorrio Porciatti, D.Sc. CANCELLED March 31, 2020
Director and Vice Chairman of Research
Evelyn F. and William L. Knight Vision Research Center
University of Miami Miller School of Medicine
Host: Monica Jablonski

Title: Life and Death of Retinal Ganglion Cells

Max Fletcher, Ph.D. CANCELLED April 7, 2020
Associate Professor of Anatomy and Neurobiology
UTHSC

Title: TBA

Bret Smith, Ph.D.

CANCELLED

April 21, 2020

Chair and Professor, of Neuroscience
University of Kentucky
Host: Dr. William Armstrong

Title: TBA

Raghu Vemuganti, Ph.D.

CANCELLED

April 28, 2020

Professor and Vice Chair of Neurological Surgery
University of Wisconsin School of Medicine and Public Health
Host: Dr. Tauheed Ishrat

Title: TBA

Sonja Scholz, M.D., Ph.D.

CANCELLED

May 5, 2020

Assistant Clinical Investigator
Neurodegenerative Disease Research Unit
NIH
Host: Dr. Jack Tsao

Title: Lewy Body Dementia: from Molecular Characterization to Precision Therapy

Habibeh Khoshbouei, Ph.D.

CANCELLED

May 12, 2020

Professor of Neuroscience
University of Florida
Host: Dr. Fu-Ming Zhou

Title: TBA

APPENDIX 4
Neuroscience News, Events and Graduate Training Flyer
FY 2019-2020

THE UNIVERSITY OF TENNESSEE
Health Science Center



William E. Armstrong, Ph.D.
Professor and Director

Neuroscience Institute • College of Medicine
875 Monroe Avenue, Rm. 422 • Memphis TN 38163
Tel: (901)448-2684 • Fax: (901) 448-4685

Nov. 1, 2018

Neuroscience Institute (NI) Postdoctoral/Research Associate Support

Purpose and Eligibility: The NI solicits proposals for supplementary funds for postdoctoral fellows whose mentors are active 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** are welcome 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 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: Nov. 30, 2018. Awards will run from Jan. 1, 2019-Dec. 31, 2019.

Submission: Please send all materials electronically to:
Brandy Fleming, Program Coordinator
Neuroscience Institute
bflem3@uthsc.edu.
Phone: 448-1286



THE
NEUROSCIENCE INSTITUTE
UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

Neuroscience Institute (NI) Research Support Grants 2020

Goal: The NI solicits applications from UTHSC NI faculty for research projects intended as: (1) supplements to existing or recently expired extramural grants or (1) development funds for new grant submissions.

Method of Support by NI: The NI will provide funds for animals, supplies, small equipment, and salaries for non-tenure track research staff. Support will be for a maximum of 1 year. Applicants may request funds for all three items, or any subset, with the following exceptions: *NI members currently receiving seed funding are ineligible. NI members currently receiving postdoctoral funds are ineligible for further postdoctoral funding, but may request other support, as listed above.*

NI Funding Levels: \$10,000-\$50,000. The amount awarded will depend on the budget justification, and the number of meritorious applications received by NI.

Eligibility and Criteria: All tenure-track NI faculty with primary faculty appointments at UTHSC and an active research program are eligible. Criteria will include:

1. Scientific merit of the proposed project.
2. History of funding and publications of the PI and key collaborators.
3. Justification of the need for supplemental funding.
4. Regarding equipment, matching funds and interest from multiple users will be factors in evaluation.
5. Degree of collaboration and cross-disciplinary interaction.
6. Faculty who are currently in a no-cost extension or who have lost funding (R01 or comparable) within the past year are also eligible. Summary sheets of recently reviewed grants should be included, as well as a brief description of the aims of the resubmission or planned new submission.

NI Application for Support:

1. Three page electronic application (PDF) that identifies the PI and other key personnel, a brief description of the project, and itemized budget (personnel, equipment, and supplies).
2. The PI and key collaborators should append a recent NIH biosketch that includes current funding, including any other UTHSC support if applicable.
3. A letter from the department chair supporting the application and stating if the submitting PI has other research funds available.

Review Process: The NI Executive Committee will review applications and a brief, written summary will be sent to the corresponding PI.

Deadline: Feb. 21, 2020. Submit electronic (PDF) copies to:

Brandy Fleming, M.S.
Program Coordinator, NI
Email: bfilemin3@uthsc.edu
Phone: 901-448-2684

For questions, please contact William Armstrong (warmstro@uthsc.edu) or Brandy Fleming (bfilemin3@uthsc.edu)

Million to Develop Novel Glaucoma Treatment

Written by Lee Ferguson | April 13, 2020

A researcher in the University of Tennessee Health Science Center's College of Medicine has been awarded a \$4.94 million R24 grant from the National Institutes of Health to advance the development of a potential new drug therapy for glaucoma.

Monica Jablonski, PhD, professor in the Department of Ophthalmology and associate dean of the Postdoctoral Office, will further develop an ophthalmic microemulsion that combats the shortcomings of standard eye drops used to lower intraocular pressure (IOP) in glaucoma patients.

Current standard treatment drops are limited by their short-lived time on the cornea, rapid drainage, and shallow penetration, which requires patients to dose multiple times a day. All this leads to lower efficacy and poor patient compliance. Dr. Jablonski and her team have created an extended release, once-daily topical treatment that delivers pregabalin – an FDA approved compound for fibromyalgia – to target tissues within the eye. A bioadhesive ingredient keeps the microemulsion in contact with the cornea for longer duration, allowing for the gradual release of pregabalin, which in turn maintains a sustained, lower intraocular pressure.



Dr. Monica Jablonski

"We have an advantage because the active pharmaceutical ingredient we are using, pregabalin, is already FDA approved," Dr. Jablonski said. "Systemic safety studies have been done, so we can refer to those. The majority of our studies will evaluate efficacy in IOP lowering."

Dr. Jablonski's proposal, titled "Novel Extended Release Glaucoma Therapy for Once Daily Dosing," is being funded for five years. She intends this R24 to provide proof of concept and address key feasibility questions by establishing efficacy, biocompatibility and biodistribution, all of which would facilitate preparing the formula for clinical trials.

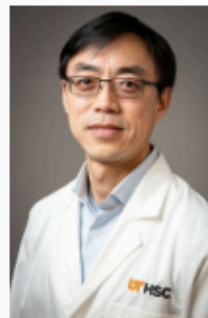
Dr. Jablonski has applied for a patent for her formulation. She founded OculoTherapy, LLC, in 2013, a startup company that has an exclusive license with the University of Tennessee Research Foundation. OculoTherapy Inc. was supported under the Innovation Lab program of the Office of Research and Memphis Bioworks, and provided research laboratory space for one year free of charge to establish the company's research and development program in 2018. Seed funding Dr. Jablonski received in 2017 in the form of a CORNET Award (an award created by UTHSC Vice Chancellor for Research Steven R. Goodman, PhD) allowed her to collect preliminary data, which she says was key to winning subsequent NIH funding.

UTHSC Team Awarded \$1.7 Million for Opioid Addiction Research

Written by Paige McKay | June 5, 2020

A team of University of Tennessee Health Science Center (UTHSC) researchers in the **College of Medicine** recently received a National Institutes of Health (NIH) award to study how genetic differences may explain why some people are more susceptible to opioid addiction than others.

Hao Chen, PhD, associate professor in the Department of Pharmacology, Addiction Science, and Toxicology, and Megan Mulligan, PhD, assistant professor in the Department of Genetics, Genomics, and Informatics, received \$1.7 million for their project titled, "Reduced complexity mapping of oxycodone self-administration and stress responsiveness in rats."



"Prescription opioid use and abuse results in millions of people addicted to opioids, and we know that genetic and environmental factors, such as stress, can interact to increase addiction vulnerability," Dr. Mulligan explained. "Unfortunately, we do not have a strong or complete understanding of how genetic differences contribute to risk of opioid addiction or contribute to stress-induced vulnerability."

To identify genetic differences in stress response, oxycodone consumption, and stress-induced drug seeking, the team will compare voluntary oxycodone intake between two strains of rats that differ in their vulnerability to stress.

"What makes this model unique is that the two strains demonstrate large differences in addiction-relevant behavior, and they are genetically similar," Dr. Mulligan said. "This makes it easier to identify the gene variants that cause differences in stress response, opioid intake, and stress-induced opioid intake."

"We can swap genetic material between the strains and study if this replacement causes changes in drug intake and seeking behavior. We can even do this in specific types of cells in a certain part of the brain," said Dr. Chen. Dr. Mulligan added, "The findings from our study have great potential to translate to the human condition of opioid addiction."



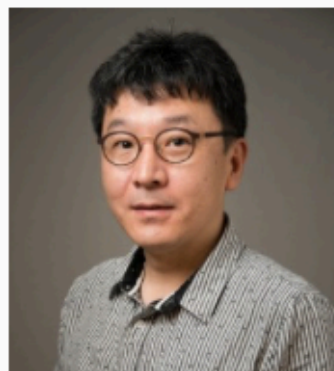
Dr. Megan Mulligan

UTHSC Researcher Il Hwan Kim, PhD, Using Self-Made Technology to Research Neural Circuits and Their Role In Psychiatric Disorders

Written by Trevor Pruitt | July 26, 2019

Il Hwan Kim, PhD, assistant professor in the Department of Anatomy and Neurobiology in the [College of Medicine](#) at the University of Tennessee Health Science Center, has been awarded more than \$1.53 million to identify neural circuit dysfunction that may cause behavioral difficulties in several mental disorders.

Difficulties with social interactions, as well as struggles with mental focus, are common symptoms in mental ailments such as schizophrenia, depression, and autism-spectrum disorder. Dr. Kim used basic medical knowledge like this from psychology, his first undergraduate college major, to establish his main research idea.



Dr. Il Hwan Kim

"Schizophrenia, autism, and depression patients share social symptoms, so that's very helpful for doctors to know... But for scientists, that connection could be a variant for our approach," Dr. Kim said. "So, I decided to forget about the name of the disorders and focused on the individual behavioral symptoms, then find the underlying mechanisms as my starting point."

According to the National Institute of Mental Health (NIMH), one in every five children and adults experience mental illness. In addition, nearly 60 percent of those with a mental illness did not receive mental health services in the past year. Research shows approximately 90 percent of people who die by suicide show symptoms of mental illnesses, a rate that has not changed since it was tracked beginning in 1965. Dr. Kim's hopes his innovative approach may provide a new framework for treating these psychiatric disorders in the future.

"There are no good medications to treat the social behavioral deficit for autism and schizophrenia patients in particular," said Dr. Kim. "But, if we can find the neural circuit dysfunction that cause the deficit, that makes it easier for scientists to develop a new medication to address it."

Dr. Kim's project entitled, "Genes, Neural Circuit, and Behavior," is being funded by the National Institutes of Health (NIH) for four years. Kim was an assistant professor in the Department of Psychiatry and Behavioral Science at Duke University before joining UTHSC in March 2019.

One Week Until- UTHSC Biomedical Symposium

Written by Jessica Baker | September 13, 2019

On behalf of the Graduate Student Executive Council (GSEC), I would like to invite you to the first annual **UTHSC Biomedical Symposium**, a student-run, one-day symposium that will be held on **Friday, September 20th** from **8am-5pm** at **Memphis Bioworks**: 20 South Dudley Street, Memphis, TN 38103.

The **UTHSC Biomedical Symposium**, titled **Pathway to Discovery: From Basic Science to Translational Medicine**, is a full-day event organized by the Graduate Student Executive Council of the College of Graduate Health Sciences at the UTHSC. Our goal is to bring together bright minds to foster an environment of learning, inspiration, and wonder through idea-focused presentations covering a wide range of subjects with the ultimate goal of provoking meaningful scientific conversations. The learning objectives for this symposium include 1) how to efficiently move from basic science discoveries to clinical applications and 2) how social determinants of health contribute to health disparities.

Speakers for the event include:

1. **Dr. Albert Garcia-Romeu** from Johns Hopkins University School of Medicine, Instructor of Psychiatry & Behavioral Sciences
 - ***The Transformative Potential of Psychedelics for Mental Healthcare***
2. **Dr. Adah Almutairi** from University of California San Diego, Professor in Skaggs School of Pharmacy & Pharmaceutical Sciences
 - ***Metallic Medicine***
3. **Dr. Minoli Perera** from Northwestern University, Professor in Department of Pharmacology
 - ***African American Pharmacogenetics: Challenges and Opportunities***
4. **Dr. Michael Kobor** from University of British Columbia, Professor of Medical Genetics
 - ***Epigenetic Embedding of Early Life Experiences- How Environments Get "Under the Skin"***
5. **Dr. Jennifer Thomas** from San Diego State University, Professor in Department of Psychology
 - ***Prenatal Exposure to Drugs of Abuse: Treatments and New Challenges***
6. **Dr. Donald Stein** from Emory University, Professor of Emergency Medicine
 - ***Clinical Trials: The Valley of Death for TBI Research? Reflecting on Failures, Mapping a Way Forward***
7. **Dr. Jeffery Medin** from Medical College of Wisconsin, Professor of Pediatric Hematology and Oncology
 - ***Lentivirus-Mediated Gene Therapy for Fabry Disease***
8. **Dr. Gregory Vidal** from UTHSC and West Cancer Clinic, Professor of Hematology/Oncology
 - ***Is There a Role for Translational Research in Social Health Outcomes?***

The UTHSC Biomedical Symposium will be followed by a **Networking Social Celebration** at the **Orpheum Theatre**. The symposium and social is **free** and **open to all**. Food and beverages will be provided at both the symposium and social. Parking is free. Promotional items and giveaways will be given to attendees. We hope to see you at the event!

For more information please email Jessica Baker (tmb818@uthsc.edu).

Visit the [UTHSC Biomedical Symposium](#) Facebook page for updated schedule and presentation topics.

Register on the [UTHSC Biomedical Symposium](#) Facebook page or through Eventbrite:

<https://www.eventbrite.com/e/uthsc-biomedical-symposium-pathway-to-discovery-tickets-63782650625?utm-medium=discovery&utm-campaign=social&utm-content=attendeeshare&aff=escb&utm-source=cp&utm-term=listing>

Frederick Boop Named President-Elect Of International Society for Pediatric Neurosurgery

Written by Alan Burns | December 12, 2019

Fredrick Boop, MD, co-director of the Neuroscience Institute at the University of Tennessee Health Science Center, was recently named president-elect of the International Society for Pediatric Neurosurgery (ISPN).

Dr. Boop is the professor and chairman of the Department of Neurosurgery at UTHSC, co-director of the Neurosurgical Intensive Care Unit at Le Bonheur Children's Hospital, and the chief of the Division of Pediatric Neurosurgery at St. Jude Children's Research Hospital.

The ISPN, representing over 350 neurosurgeons around the world, has sought to improve the health and welfare of children requiring neurosurgical care throughout the world by scientific research and international cooperation since its founding in 1972. As the largest organization for pediatric neurosurgeons worldwide, the group hosts scientific meetings annually, provides teaching courses and traveling scholarships for pediatric neurosurgery in developing countries, and provides a monthly online journal and free online textbook accessible across the world.

"The ISPN is a rapidly growing and exciting group of like-minded physicians and trainees from all countries," Dr. Boop said. "It is a tremendous honor for me to have been nominated president-elect of such a magnificent group."



Dr. Frederick Boop

Valeria Vásquez Receives Margaret Oakley Dayhoff Award

Written by Amber Carter | September 16, 2019

Valeria Vásquez, PhD, assistant professor in the Department of Physiology in the **College of Medicine** at the University of Tennessee Health Science Center, is the recipient of the Margaret Oakley Dayhoff Award from the Biophysical Society, an organization that encourages the development and dissemination of knowledge in biophysics. Dr. Vásquez was recognized for her pioneering work toward understanding how the functions of sensory ion channels are modulated by bioactive lipids and natural toxins.

She will receive the award in February, during the organization's annual meeting in San Diego.

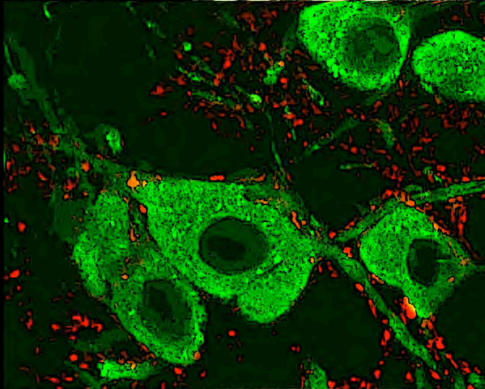
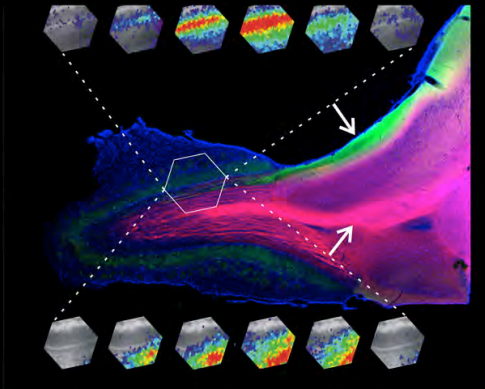
Presented annually, the Margaret Oakley Dayhoff Award is given to a woman who holds very high promise or has achieved prominence while developing the early stages of a career in biophysical research within the purview and interest of the Biophysical Society. It is given in memory of Dr. Margaret Dayhoff, former president of the Biophysical Society, professor of Biophysics at Georgetown University, and director of Research at the National Biomedical Research Foundation.



Dr. Valeria Vásquez (Photo by Allen Gillespie/UTHSC)



Graduate Studies in Neuroscience



The Neuroscience Graduate Program is a multidisciplinary, interdepartmental Ph.D. program at the University of Tennessee Health Science Center (UTHSC) and supported by the Neuroscience Institute. Established in 1985, the Neuroscience Institute comprises over 90 faculty from multiple departments and colleges, including Anatomy and Neurobiology, Medicine, Molecular Sciences, Neurology, Neurosurgery, Ophthalmology, Pathology, Pediatrics, Pharmaceutical Sciences, Pharmacology, Physiology, and Surgery. Some faculty hold primary appointments at the world-renowned St. Jude Children's Research Hospital (SJCRRH) a short distance away. Our program provides broad training in neurophysiology, neuropharmacology, neuroanatomy, molecular and cellular neuroscience, developmental neurobiology, and behavioral neuroscience.

Basic and clinical Neuroscience research at UTHSC focus on intracellular signaling pathways, neuronal excitability, synaptic transmission, sensory processing and retinal biology, neurological and neurodegenerative disorders, brain tumors, neurogenetics and neural development, and mental and addictive disorders. UTHSC is one of the world's leading centers exploiting novel genetic approaches to explore brain development, function and behavior, and psychiatric and neurodegenerative diseases. Neuroscientists at SJCRRH are studying diverse pediatric tumors and diseases in the CNS using cutting-edge molecular, genomic and genetic methods.

Memphis is a culturally diverse metropolitan area of over 2.5 million residents, with the rich traditions of a city on the banks of the Mississippi River. Memphis has more sunny days than Miami, and combines southern heritage and hospitality with contemporary charm. You'll enjoy great dining (world famous barbecue), art galleries and an exciting nightlife. Memphis is a must for those wanting to visit the birthplace of blues, soul, and rock and roll. Sun Studio, The Rock 'N' Soul Museum, Gibson Guitar Factory and Beale Street entertainment district are just a few blocks from campus, as is the Mississippi River, and downtown. The city is runner and bike-friendly, with a new "greenline" extending to the city center from a 3200 acre urban park (Shelby Farms) that also provides fishing and horseback riding. Memphis is home to FedEx, to the NBA's Memphis Grizzlies, and to the Memphis Zoo, ranked one of the top zoos in the US and home to over 3500 animals on 76 beautifully landscaped acres.

To apply to the Neuroscience Track of our Graduate Program, please go to the Integrated Biomedical Science Program website:
<http://www.uthsc.edu/grad/IBS>

To find out more about Neuroscience and our program, please visit our website:
<http://www.uthsc.edu/neuroscience>

