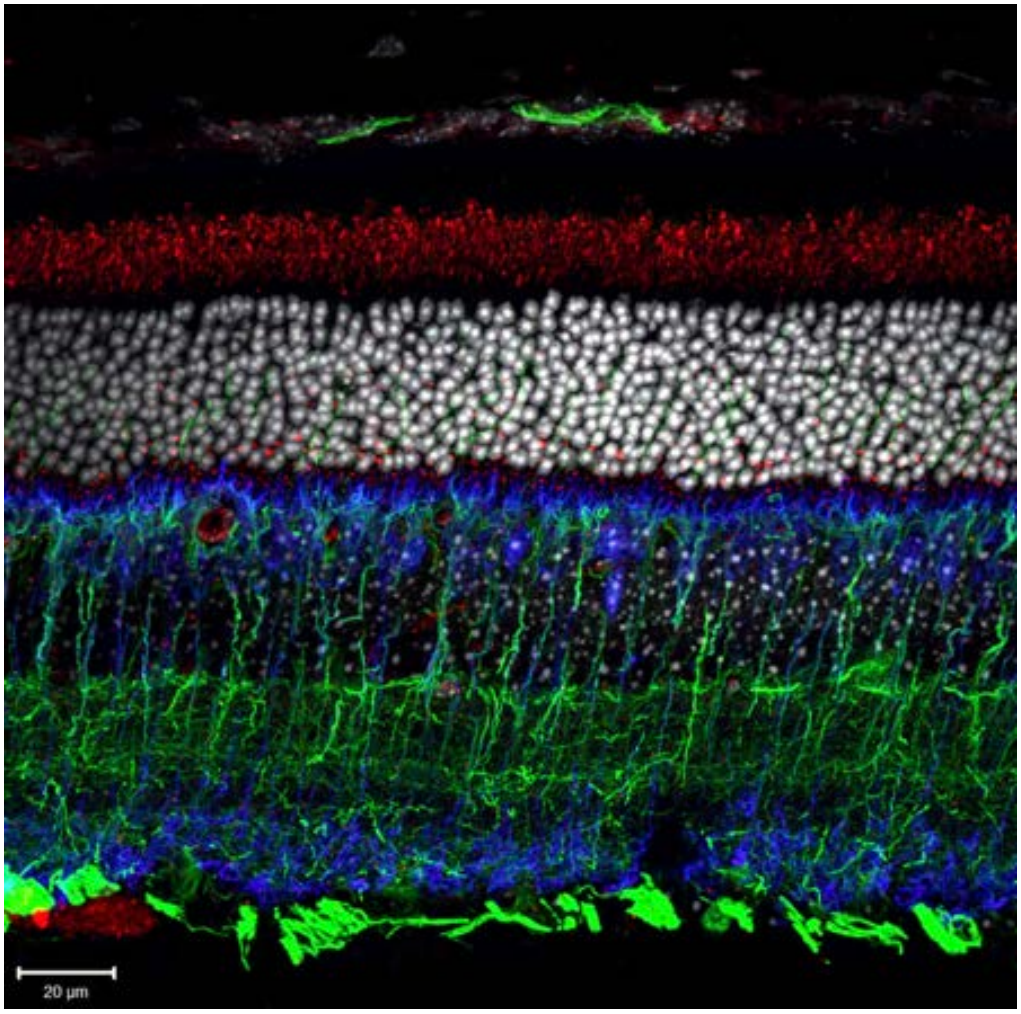
THE NEUROSCIENCE INSTITUTE
UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

THEC Neuroscience Center of Excellence

Annual Report to the
Tennessee Higher Education Commission (THEC)
Fiscal year 2019 (7/1/2018-6/30/2019)



I. MISSION STATEMENT

The Neuroscience Institute at 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 10 departments and two 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/

II. EXECUTIVE SUMMARY

In FY 2019 the NI/Center of Excellence continued the seed support of Dr. Tauheed Ishrat, a recently recruited and R01-funded associate professor and stroke/Alzheimer's neurobiologist in Anatomy and Neurobiology. We helped successfully recruit Il Hwan Kim, Ph.D. (**see Appendix 4**), from Duke university into the Anatomy and Neurobiology department (arrival, Feb 2019), and committed seed funding for him. We provided stipend support to 5 graduate students, and have 15 students in the Neuroscience Track of the Integrated Biomedical Sciences Ph.D. program, after graduating 2 and accepting 4 new students. We supported 11 postdocs in the Departments of Anatomy and Neurobiology, Neurology, Ophthalmology, Pharmacology and Physiology, and 4 new undergraduate summer Neuroscience merit fellows from Christian Brothers University and Rhodes College to work in the departments of Anatomy and Neurobiology, Pharmacology and Neurology. 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. We partnered with Chancellor Schwab to upgrade the Zeiss 710 to include an additional scanner for high resolution confocal microscopy (Airyscan). We supplemented the service contracts of these instruments and software to keep user fees low. We supported the Imaging Center's technical directors: TJ Hollingsworth, Ph.D., replaced by Esther Marquez Wilkins, Ph.D. in May of 2019. We promoted neuroscience research by providing the weekly Neuroscience Seminar series and a Neuroscience Workshop, mixing outside with UTHSC and affiliated faculty.

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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

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
http://www.uthsc.edu/neuroscience

V. FACULTY OF THE NEUROSCIENCE INSTITUTE

The Neuroscience Institute is currently comprised of 75 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 UTK are so indicated. * indicates new member. We lost 3 members and added 2 new members (*) this past FY.

Department of Anatomy and Neurobiology

Matthew Ennis, Ph.D., Simon R. Bruesch Professor and Chair
William E. Armstrong, Ph.D., Professor Emeritus and NI Director
John D. Boughter, Jr., Ph.D. Professor
Joseph C. Callaway, Ph.D., Associate Professor
Viktor Chizhikov, Ph.D., Associate Professor
Alessandra d'Azzo, Ph.D., Affiliated Professor (St. Jude)
Michael A. Dyer, Ph.D., Affiliated Professor (St. Jude)
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., Affilliated Assistant Professor (St. Jude)
Reese S. Scroggs, Ph.D., Associate Professor
J. Paul Taylor, M.D., Ph.D., Affiliated Professor (St. Jude)
Robert S. Waters, Ph.D., Professor
Steven L. Youngentob, 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 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

Rajashekhar 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., Assistant 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., Assistant Professor

Paula Dietrich, Ph.D., Assistant Professor

Department of Preventive Medicine

Khyobeni Mozhui, Ph.D., Assistant Professor

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

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. Matt 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. 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 15 students, four of whom are at St. Jude's, the others of whom placed with mentors at UTHSC in Anatomy and Neurobiology, Neurology, Ophthalmology and Pharmacology. This past academic year saw 4 students receive their Ph.D. and obtain successful postdocs: Kevin Hope, Sarah Neuner (Icahn School of Medicine), Zach Goldsmith, and Jordan Ross (Georgia State University).

Three NI supported students have been awarded nationally competitive NIH F31 predoctoral fellowships during their graduate tenure: Sarah Neuner, Jordan Ross, and Jessica Baker. As stated above, Drs. Neuner and Ross have recently graduated and left for postdocs. Ms. Baker still works with Dr. Kirsten Hamre in Anatomy and Neurobiology on development effects of alcohol. 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. We also had one other neuroscience student, Kevin Hope, who had a fellowship from Dup15q Alliance to study genetics of autism with Dr. Larry Reiter in Neurology.

Postdoctoral Students: The NI supports matching postdoctoral fellowships to some extent every calendar year, and successful postdocs can get support for a maximum of 2 years. We had 11 postdoc slots at varying amounts and times this past FY (see Budget). In January of 2019, we made Postdoctoral/Research Associate Awards to the following candidates with mentors in the Neuroscience Institute:
Qian Wang (Pharmacology, Dr. Fu-Ming Zhou), Purnima Singh (Pharmacology, Dr. Kafait Malik), Doaa Maria (Ophthalmology, Dr. Monica Jablonski), Raji Lenin (Ophthalmology, Dr. Gangaraju), Rebecca Caires Mugarra (Physiology, Dr. Julio Cordero-Morales), Mohammad Khan (Neurology, Dr. Mark Ledoux), Priya Muralidharan (Physiology, Dr. Jonathan Jaggar) and Igor Iskusnykh (Anatomy and Neurobiology , Dr. Victor Chizhikov). The 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/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 twelve different departments in the College of Medicine and two in College of Pharmacy, 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, LeBonheur Children's Hospital, Christian Brothers University, and at the University of Memphis.

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 now by Dr. Esther Marquez Wilkins, Ph.D., who replaced Dr. TJ Hollingsworth, Ph.D. in May of 2019. Dr. Marquez Wilkins 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 working solely part-time as NI Director, on contract from Aug. 1, 2019-July 31, 2020. UTHSC administration is in the process of selecting a new NI director.

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, 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/imaging-center/index.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/behavioral-core/), and is managed by Professor Mike McDonald of Neurology. NI helped recruit Dr. McDonald several years ago, providing him 3 years of salary support and an office. 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/). 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:

A. Babajani-Feremi	*Ped. Neurology*	I. Dragatsis	*Physiology*
D. Heck	*Anat. & Neurobiology*	B. Jones	*Genetics, Gen. Inform.*
H. Kita	*Anat. & Neurobiology*	F.-F. Liao	*Pharmacology*
L. Reiter	*Neurology*	T. Nowak	*Neurology*
T. Ishrat	*Anat & Neurobiology*	A. Reiner	*Anat. & Neurobiology*
J. Tsao	*Neurology*	J. Wheless	*Ped. Neurology*
Jianxiong Jiang	*Pharmaceutical Sciences*		

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:

R. Foehring	*Anat. & Neurobiology*	H. Kita	*Anat. & Neurobiology*
W. Armstrong	*Anat. & Neurobiology*	R. Scroggs	*Anat. & Neurobiology*
J. Callaway	*Anat. & Neurobiology*	S. Tavalin	*Pharmacology*
J. Cordero-Morales	*Physiology*	R. Waters	*Anat. & Neurobiology*
A. Dopico	*Pharmacology*	V. Vásquez	*Physiology*
M. Ennis	*Anat. & Neurobiology*	D. Heck	*Anat. & Neurobiology*

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:

M. Ennis	*Anat. & Neurobiology*	R. Nelson	*Anat. & Neurobiology*
J. Boughter	*Anat. & Neurobiology*	R. Scroggs	*Anat. & Neurobiology*
J. Cordero-Morales	*Physiology*	R. Waters	*Anat. & Neurobiology*

M. Fletcher	*Anat. & Neurobiology*	V. Vásquez	*Physiology*
D. Heck	*Anat. & 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:

M. Dyer	*Ophthalmology*	A. Reiner	*Anat. & Neurobiology*
M. Jablonski	*Ophthalmology*	R. Williams	*Gen, Genomics, & 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:

R. Williams	*Gen, Genomics, & Inform*	L. Lu	*Anat. & Neurobiology*
J. Boughter	*Anat. & Neurobiology*	P. McKinnon	*Anat. & Neurobiology/St. Jude*
V. Chizhikov	*Anat. & Neurobiology*	J. Morgan	*Anat. & Neurobiology/St. Jude*
A. d'Azzo	*Anat. & Neurobiology/St. Jude*	K. Mozui	*Preventive Medicine*
I. Dragatsis	*Physiology*	A. Reiner	*Anat. & Neurobiology*
K. Hamre	*Anat. & Neurobiology*	L. Reiter	*Neurology*
J. Han	*Pediatrics/Le Bonheur*	M. Honig	*Anat. & Neurobiology*

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 and addiction, and drug-induced changes in brain function that may be responsible for relieving mental disorders or producing addiction.

Faculty:

H. Chen	*Pharmacology*	B. Sharp	*Gen., Genomics & Inform.*

A. Dopico	*Pharmacology*	J. Steketee	*Pharmacology*
K. Hamre	*Anat. & Neurobiology*	S. Tavalin	*Pharmacology*
K. Sakata	*Pharmacology*	F. Zhou	*Pharmacology*
I H Kim	*Anat. & 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, but he has yet to draw on his funds. He will have 5 years to spend these funds. During FY 2019, we also engaged in a search for another neurobiologist who would start in January 2020. We successfully recruited Dr. Jianyang Du from the University of Toledo, who will arrive in 2020 with an R01 in the department of Anatomy and Neurobiology. We have committeed $100,000 toward his seed package, but will wait to disseminate when Dr. Ishrat has finished his NI funding.

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 the JEOL 2000 electron microscope and the Zeiss 710 confocal. In addition, we partnered with Chancellor Schwab to add the super resolution Airyscan scanner to our Zeiss 710 confocal ($135,000 between the two), allowing users to choose between the high resolution scanner and the more conventional 710 scanner. The web site for the Imaging Center is: (http://www.uthsc.edu/neuroscience/imaging-center/index.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 from their mentor. This for FY 2019 we spent $30,030 on matching stipends, and another $1750 on travel support. We currently have 15 Neuroscience students, including 2 new students who entered in the Fall of 2019. This past year we graduated Sarah Neuner, Zach Goldsmith, Jordan Ross and Kevin Hope, all of whom are now postdoctoral research fellows. 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 11 postdoctoral fellows or research associates for FY 2019. These awards range from $10,000-$15,000 each and totaled $101,265. The postdocs were located in the Departments of Anatomy and Neurobiology, Neurology, Opthalmology, Pharmacology, 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 2018-2019 academic year, the NI sponsored the weekly Neuroscience Seminar Series, hosting 23 speakers, 19 from outside and 4 from Memphis. 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 William Armstrong), where students give seminars and receive critical feedback from their colleagues. A complete list of FY 2018-2019 seminar speakers and their topics are provided in **Appendix 3**.

NI Sponsored Workshop: Rather than a symposium, this past year NI co-sponsored the visit of Kwanghun Chung, Ph.D. from the Department of Chemical Engineering Institute of Medical Engineering & Science, MIT. Dr. Chung is a world-reknowned expert in the use of light sheet confocal microscopy employing completely cleared rodent brains, allow one to visual genetically or immunochemically marked fluorescing neurons in three dimensions, in the whole brain. Dr. Chung gave two talks, one in NI entitled: *"Holistic Molecular Imaging and Rapid Phenotyping of Complex Biological Systems"* **(see Appendix 3)**, and another sponsored by Advanced Animal Imaging (AAI) Core and the Office of Research, who helped pay for his visit, entitled "*From Samples to Data: Engineering Principles and Practical Considerations for Holistic Tissue Imaging and Phenotyping*." Dr. Chung spent two days at UTHSC and met with scientists interested in using the light sheet microscope housed in Pharmacology to study cleared rodent brains. (**See Appendix 4).**

***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 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). New scholars are picked every Spring. We spent $10,258 supporting these and 4 additional scholarships in the summer of 2018 (after July 1, 2018, so part of FY2019.

VIII. GOALS AND FUTURE PLANS

***Faculty Support and Recruitment*: 1)** We were given permission by Interim College of Medicine Steven Schwab to recruit a mid-level neuroscientist into the Department of Anatomy and Neurobiology for FY2018. Chair of Anatomy and Neurobiology, Dr. Matt Ennis, and Dr. Armstrong co-chaired the search committee for this recruitment. This resulted in the acceptance of a position by Dr. Il Hwan Kim of Duke University **(see Appendix 4**), who studies the neural pathways involved in social behavior using modern techniques such as optogenetics and cell specific targeting. Dr. Kim is funded with an R56 and now an R01 from NIH. NI committed $150,000 to Dr. Kim's startup, partnering with the COM. He arrived on campus Febuary of 2019. Our new College of Medicine Dean, Dr. Scott Strome, approved Anatomy and Neurobiology to recruit another candidate for FY 2019-2020, and this resulted in the recent acceptance of our offer from Dr. Du, coming from University of Toledo. He will arrive in January of 2020, and will be given $100,000 from the NI over 5 years, once Dr. Ishrat has spent his seed money.

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.

Graduate Student Support and Recruiting: We will recruit 4-6 new students into the Neuroscience Track for fall of 2020. These interviews run from January-March of 2020. We will support 3 students in their 3rd or 4th year 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. Ishrat and Sakata 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 commit funds for up to 6 postdocs in FY 2019-2020. Requests for applications will be sent out in November 2019 for a January 2020 start date. These applications are competitive, and ranked by the NI Executive Committee. See Budget for FY 2020 for further details.

***NI Neuroscience Seminar Series and Symposia**:* We will continue to run the Neuroscience Seminar Series, and already have our Fall Schedule, with seminars that started in September. We will solicit nominations from the faculty for spring of 2020 in November 2019. We expect to host around 25 seminars, the majority of which will feature guests from out of town. We may also sponsor a symposium or another workshop in the spring of 2020, depending on available funds.

***Undergraduate Research Fellows*:** We will support up to 4 undergraduate research fellows from Rhodes College, Christian Brothers University, or University of Memphis. Applications will be processed in the spring of 2020.

IX. BUDGET (see Schedule 7, page 21)

A. FY 2019. The FY 2019 THEC appropriated budget for the UTNI was $601,491
We carried forward $219,483 from the previous year for a total budget of $820,974. 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, and monies encumbered to support our new faculty hires for whom we provided seed packages (Drs. Ishrat and Kim).

This past FY, we expended $473,419 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**.**

Students: We awarded matching or partial funds for 6 graduate stipends to PIs with Neuroscience track graduate students for a total $30,030. The mentors were located in the departments of Neurology, Anatomy and Neurobiology and Ophthalmology.

***Postdoctoral Support**:* We provided matching funds for 11 postdoctoral fellows, for a total $101,265. 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 $46,044, which was used against the fees needed to pay the service contracts on the Zeiss 710 ($22,690), the JEOL 2000 ($16,800). In addition we encumbered $67,500 on the Airyscan high-resolution upgrade to the Zeiss 710.

Neuroscience Behavioral Core: The procedures for use and available equipment can be viewed at: http://www.uthsc.edu/neuroscience/behavioral-core/index.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: http://www.uthsc.edu/neuroscience/imaging-center/microtomy.php.

***Seminars and Symposia*:** Additional funds went to support travel/lodging/meals ($12,892) and honoraria ($3,250), for the Neuroscience Seminar series and Workshop (see **Appendices 3, 4**).

Research Projects*:* We provided startup funds for Dr. Ishrat, who was awarded $150,000, respectively. Dr. Chizhikov's ($150,000) finished his support effective Septmember 2018, and Dr. Ishrat's support, which began in February of 2018, can be spread over the next 3-5 years. Any unspent funds are reflected in our carryover.

Undergraduate Fellowships: NI supported 4 undergraduate Neuroscience Merit Fellows at $3000-4000 each (total, $10,258) for summer research.

Travel Awards: $3251 in travel awards for graduate students and postdoctoral fellows were awarded.

B. FY 2020. We will carryover $264,226 to the coming fiscal year, and have been appropriated $613,094 for a total of $877,320. 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 FY2020:

Students: For the coming year, we have awarded matching funds for **3** graduate stipends to PIs with Neuroscience track graduate students. Mentors are located in the departments of Anatomy and Neurobiology and Neurology. The NI match is ~$14,500 each for 3 of these making an expected total of ~$43,600.

Postdoctoral Support*:* This year we will continue to provide funds for ~6 postdoctoral fellows ($10,000-15,000 each for a total of ~$60,000 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 $30,000 for new

postdoctoral fellows, bringing the total expected postdoctoral expenditures to $90,000 during FY 2020.

***Neuroscience Imaging Center*:** We will pay the service contracts on the JEOL 2000 ($16,800), for the Zeiss 710 Confocal ($22,689). Our Microbrightfield contract for the Neurolucida workstation is already paid for 2019-2020. We encumbered $67,5000 to match with the Chancellor's gift to order the Airyscan upgrade to our Zeiss 710 confocal microscope (total: $135,000). This bill was recently paid.

***Neuroscience Behavioral Core**:* We will continue to support the Behavioral Core in FY2020, 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 in the Microtomy core, either by purchasing a used one or investing in significant repair.

***NI Faculty*:** We will provide administrative supplements to Drs. Armstrong 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, scheduled to arrive in January of 2020. However, with the obligations to Drs. Ishrat and Kim, and to student and postdoctoral fellowships, the contribution to Dr. Du will not exceed $25,000 over 4 years beginning 2020.

Research Projects and Bridge Funding: We can provide small amounts of bridge assistance, but this will be limited by our commitments to seed packages for previously recruited (Dr. Ishrat) and newly recruited (Dr. Kim, and Dr. Du) faculty.

Seminar Series and Community Outreach: We will offer our weekly Neuroscience Seminar series. 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).

Schedule 7

CENTERS OF EXCELLENCE ACTUAL, PROPOSED, AND REQUESTED BUDGET

Institution: UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER **Center:** NEUROSCIENCE

	FY 2017-18 Actual			FY 2018-19 Proposed			FY 2019-20 Requested		
	Matching	Appropr.	Total	Matching	Appropr.	Total	Matching	Appropr.	Total
Expenditures	**$833,179**	**$556,747**	**$1,389,926**	**$886,757**	**$877,320**	**$1,764,077**	**$913,360**	**$643,749**	**$1,557,109**
Salaries									
Faculty	$179,095	$8,310	**$187,405**	$184,468	$15,500	**$199,968**	$190,002	$5,000	**$195,002**
Other Professional	$40,564	$123,824	**$164,388**	$41,781	$127,539	**$169,320**	$43,034	$131,365	**$174,399**
Clerical/ Supporting	$178,688	$106,477	**$285,165**	$184,048	$109,568	**$293,616**	$189,570	$112,855	**$302,425**
Assistantships	$272,700	$129,151	**$401,851**	$309,463	$139,500	**$448,963**	$318,747	$120,000	**$438,747**
Total Salaries	**$671,047**	**$367,762**	**$1,038,809**	**$719,760**	**$392,107**	**$1,111,867**	**$741,353**	**$369,220**	**$1,110,573**
Longevity (Exclude from Salaries and include in Benefits)	$6,490	$3,459	**$9,949**	$6,685	$4,000	**$10,685**	$6,886	$4,500	**$11,386**
Fringe Benefits	$155,642	$102,198	**$257,840**	$160,312	$125,724	**$286,036**	$165,121	$129,496	**$294,617**
Total Personnel	**$833,179**	**$473,419**	**$1,306,598**	**$886,757**	**$521,831**	**$1,408,588**	**$913,360**	**$503,216**	**$1,416,576**
Non-Personnel									
Travel	$0	$13,342	**$13,342**	$0	$25,000	**$25,000**	$0	$27,000	**$27,000**
Software	$0	$6,336	**$6,336**	$0	$8,000	**$8,000**	$0	$1,000	**$1,000**
Books & Journals	$0	$0	**$0**	$0	$0	**$0**	$0	$0	**$0**
Other Supplies	$0	$35,617	**$35,617**	$0	$53,439	**$53,439**	$0	$52,183	**$52,183**
Equipment	$0	$0	**$0**	$0	$67,500	**$67,500**	$0	$0	**$0**
Maintenance	$0	$44,555	**$44,555**	$0	$55,000	**$55,000**	$0	$57,750	**$57,750**
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):									
Startup Funds	$0	$0	**$0**	$0	$150,000	**$150,000**	$0	$0	**$0**
Media Processing	$0	$135	**$135**	$0	$600	**$600**	$0	$600	**$600**
Communication	$0	$712	**$712**	$0	$950	**$950**	$0	$1,000	**$1,000**
Rentals & Insurance	$0	$2,371	**$2,371**	$0	$3,000	**$3,000**	$0	$3,000	**$3,000**
Contractual & Special Services	$0	$13,177	**$13,177**	$0	$20,000	**$20,000**	$0	$25,000	**$25,000**
Other Services & Expenditures	$0	-$38,321	**-$38,321**	$0	-$35,000	**-$35,000**	$0	-$35,000	**-$35,000**
Insurance & Interest	$0	$5,404	**$5,404**	$0	$7,000	**$7,000**	$0	$8,000	**$8,000**
Direct Cost Share	$0	$0	**$0**	$0	$0	**$0**	$0	$0	**$0**
Total Non-Personnel	**$0**	**$83,328**	**$83,328**	**$0**	**$355,489**	**$355,489**	**$0**	**$140,533**	**$140,533**
GRAND TOTAL	**$833,179**	**$556,747**	**$1,389,926**	**$886,757**	**$877,320**	**$1,764,077**	**$913,360**	**$643,749**	**$1,557,109**
Revenue									
New State Appropriation	$0	$601,491	**$601,491**	$0	$613,094	**$613,094**	$0	$643,749	**$643,749**
Carryover State Appropriation	$0	$219,483	**$219,483**	$0	$264,226	**$264,226**	$0	$0	**$0**
New Matching Funds	$833,179	$0	**$833,179**	$886,757	$0	**$886,757**	$913,360	$0	**$913,360**
Carryover from Previous Matching Funds	$0	$0	**$0**	$0	$0	**$0**	$0	$0	**$0**
Total Revenue	**$833,179**	**$820,974**	**$1,654,153**	**$886,757**	**$877,320**	**$1,764,077**	**$913,360**	**$643,749**	**$1,557,109**

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 171 papers!**

XI. EXTRAMURAL FUNDING OF NEUROSCIENCE FACULTY

The UT Neuroscience Institute is a concentrated, interdepartmental Neuroscience program. For FY2018-2019, Anatomy and Neurobiology (12 funded Neuroscientists) was ranked ***16th in the category of Neuroscience departments among public university medical schools in NIH funding (36^{tt} overall), and 27th among public university Anatomy and Cell Biology Departments (43rd overall).*** Other participating NI departments that are well ranked include **Physiology** (5 funded NI members), which was ranked ***16th among public medical schools and 27th overall*** (of 81), and **Pharmacology** (7 funded members), ***ranked 29th in public universities, and 43rd overall*** (of 94) (Statistics from Blue Ridge Institute for Medical Research (http://www.brimr.org/NIH_Awards/2018/NIH_Awards_2018.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 **$17,821,247.** 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 examples of recently awarded faculty.

APPENDIX 1

External Funding of Neuroscience Institute Faculty

FY 2018-2019

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	1F31AA026498-02	12/1/2018	11/30/2019	$35,048
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	1F31AA026498-02 Revised	12/1/2018	11/30/2019	$972
Boughter, John, ***Co-PI Max Fletcher**	Anatomy and Neurobiology	Spatial taste coding in mouse gustatory cortex	HHS - NIH - NIDCD - National Institute on Deafness and Other Communication	1R01DC016833-02	5/1/2019	4/30/2020	$379,687
Bukiya, Anna	Pharmacology	Cholesterol control of alcohol-induced cerebral artery constriction	HHS - NIH - NIAAA - National Institute on Alcohol Abuse and Alcoholism	1R01AA023764-05	5/1/2019	4/30/2020	$342,000
Chen, Hao	Pharmacology	System genetics of menthol and nicotine addiction	HHS - NIH - NIDA - National Institute on Drug Abuse	1U01DA047638-01A1	4/1/2019	12/31/2019	$553,140
Chizhikov, Viktor	Anatomy and Neurobiology	Mesenchymal-neuroepithelial interactions in the developing telencephalon.	HHS - NIH - NINDS - National Institute of Neurological Disorders and	5R01NS093009-04	6/1/2019	5/31/2020	$334,059
Cordero-Morales, Julio	Physiology	The Role of Bioactive Lipids in Transient Receptor Potential Channels Gating	HHS - NIH - NIGMS - National Institute of General Medical Sciences	1R01GM125629-02	1/1/2019	12/31/2019	$304,000
Dopico, Alejandro	Pharmacology	Regulation of arterial diameter through specific sensing of endogenous steroids and novel nonsteroidal analogs by BK channel subunits.	HHS - NIH - NHLBI - National Heart, Lung, and	1R01HL147315-01	3/20/2019	3/20/2019	$609,360
Dopico, Alejandro	Pharmacology	Ethanol Actions on SLO Channels from Arteries vs. Brain	HHS - NIH - NIAAA - National Institute on Alcohol Abuse and Alcoholism	5 R37 AA011560-21	7/1/2018	6/30/2019	$371,171
Dragatsis, Ioannis	Physiology	Genetic restoration of IKAP as a tool to study Familial Dysautonomia	HHS - NIH - NINDS - National Institute of Neurological Disorders and	1R21NS112989-01	6/1/2019	5/31/2020	$228,000
Dragatsis, Ioannis	Physiology	Genetic modulators of 3-NP neurotoxicity	HHS - NIH - NIEHS - National Institute of Environmental Health Sciences	1R21ES028429-02	8/15/2018	7/31/2019	$190,000
Fletcher, Max	Anatomy and Neurobiology	Cholinergic modulation of olfactory bulb glomerular sensitivity	HHS - NIH - NIDCD - National Institute on Deafness and Other Communication	5R01DC013779-05	3/1/2019	2/28/2020	$345,473
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	2R01NS044163-15	2/1/2019	1/31/2020	$466,986
Hamre, Kristin, *** Co-PI Daniel Goldowitz, UBC, Candada**	Anatomy and Neurobiology	Maternal genotype, choline intervention, & epigenetics in Fetal Alcohol Syndrome	HHS - NIH - NIAAA - National Institute on Alcohol Abuse and Alcoholism	5R01AA023508-03S1	3/1/2019	2/28/2020	$83,193
Hamre, Kristin, *** Co-PI Daniel Goldowitz, UBC, Candada**	Anatomy and Neurobiology	Maternal genotype, choline intervention, & epigenetics in Fetal Alcohol Syndrome	HHS - NIH - NIAAA - National Institute on Alcohol Abuse and Alcoholism	5R01AA023508-04	3/1/2019	2/28/2020	$296,166
Han, Joan	Pediatrics-Obesity	Subaward from Univ. of Memphis - 1R21DK113344The Impact of Stress and Resilience on Obesity-Related Metabolic Complications in Adolescents (ODV+)	University of Memphis (UM)	A19*0037-002	9/1/2018	6/30/2019	$22,448
Han, Joan	Pediatrics-Obesity	Subaward: Melanocortin agonist to bypass leptin resistance of Bardet-Biedl Syndrome	Jackson Laboratory	210260-0519-03 am1	6/1/2018	5/31/2019	$30,400
Han, Joan	Pediatrics-Obesity	Salary support for Joan Han	Memphis Research Consortium		6/30/2019	5/31/2020	$268,500
Han, Joan	Pediatrics-Obesity	Start-up Funds	Memphis Research Consortium		7/1/2018	6/30/2019	$50,000
Heck, Detlef	Anatomy and Neurobiology	Neuronal mechanisms of cerebellar cognitive function	HHS - NIH - NIMH - National Institute of Mental Health	1R01MH112143-02	6/25/2019	12/31/2019	$397,459
Heck, Detlef	Anatomy and Neurobiology	Neuronal mechanisms of cerebellar cognitive function	HHS - NIH - NIMH - National Institute of Mental Health	1R01MH112143-02S	6/25/2019	12/31/2019	$282,697
Heck, Detlef	Anatomy and Neurobiology	Engrailed genes and cerebellum morphology, spatial gene expression and circuitry	Memorial Sloan Kettering Cancer Center		1/21/2019	11/30/2019	$38,000
Ishrat, Tauheed	Anatomy and Neurobiology	Mechanisms and therapeutic targets of neurovascular injury in hyperglycemic stroke	HHS - NIH - NINDS - National Institute of Neurological Disorders and	7R01NS097800-04	6/1/2019	5/31/2020	$332,500
Jablonski, Monica	Ophthalmology	Extended release formulation of pregabalin: a new glaucoma therapy	University of Tennessee Research Foundation (UTRF)		1/2/2019	10/4/2019	$30,000
Jablonski, Monica	Ophthalmology	Genetic Modulation of Glaucoma	HHS - NIH - NEI - National Eye Institute	2R01EY021200-05	2/1/2019	1/31/2020	$391,271
Jablonski, Monica	Ophthalmology	Evaluation and inhibition of efflux pumps expressed on the blood ocular barrier	University of Mississippi (UM)	UMsub 15-03-031 Mod 4 1R01EY022120-01A1		2/28/2019	$7,047
Jablonski, Monica	Ophthalmology	New Glaucoma Models Mined from an Inbred Genetic Reference Panel	Bright Focus Foundation		7/1/2018	6/30/2020	$150,000
Jaggar, Jonathan	Physiology	Blood pressure regulation by smooth muscle cell ion channels	HHS - NIH - NHLBI - National Heart, Lung, and	5R01HL133256-03	4/1/2019	3/31/2020	$380,000

Lead PI	Department	Project Title	Sponsor	Award Number	Begin Date	End Date	Total Amount
Jaggar, Jonathan	Physiology	Endothelial cell potassium channels	HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute	1R01HL137745-02	7/1/2018	6/30/2019	$490,268
Jiang, Jianxiong	Pharmaceutical Sciences	Targeting Prostaglandin Receptor EP2 for Glioma and Associated Epilepsy	HHS - NIH - NINDS - National Institute of Neurological	1R21NS109687-01	1/1/2019	12/31/2019	$190,000
Jiang, Jianxiong	Pharmaceutical Sciences	Inflammatory regulation of neurotrophin signaling in epileptogenesis	HHS - NIH - NINDS - National Institute of Neurological	7R01NS100947-03	12/5/2018	11/30/2019	$332,500
Jiang, Jianxiong	Pharmaceutical Sciences	Inflammatory regulation of neurotrophin signaling in epileptogenesis	HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke	7R01NS100947-03 Revised	12/5/2018	11/30/2019	$41,403
Jiang, Jianxiong	Pharmaceutical Sciences	Prostaglandin signaling following seizures	HHS - NIH - NINDS - National Institute of Neurological	7R00NS082379-06	8/3/2018	6/30/2019	$190,000
Jones, Byron	Genetics, Genomics, Informatics	Neural toxicity of paraquat is related to iron regulation in the midbrain	Institute of Environmental Sciences, NIH	5R01ES022614-06	5/1/2018	4/30/2019	$460,929
Jones, Byron	Genetics, Genomics, Informatics	Neural toxicity of paraquat is related to iron regulation in the midbrain	Institute of Environmental Sciences, NIH	5R01ES022614-06S1	5/1/2018	4/30/2019	$5,460
Khan, Mohammad Moshahid	Neurology	DNA double-strand breaks: A new therapeutic target for AD/ADRD	William and Ella Owens Medical Research Foundation		5/7/2019	5/6/2020	$119,362
Kim, Il Hwan	Anatomy and Neurobiology	Genes, Neural Circuits and Behavior	HHS - NIH - NIMH - National Institute of Mental Health	1R01MH117429-01A1	6/18/2019	4/30/2020	$340,823
Liao, Francesca-Fang	Pharmacology	Is HSF1 the key in mediating Hsp90 inhibitor effect in AD?	HHS - NIH - NIA - National Institute on Aging	5R01AG049772-05	5/1/2019	4/30/2020	$280,440
Liao, Francesca-Fang	Pharmacology	Novel mechanistic link between metabolic changes and dementia potential role of miRNA21	HHS - NIH - NIA - National Institute on Aging	1R01AG058467-01A1	8/1/2018	5/31/2019	$520,453
Lu Lu, **Co-PI *Yao Sun**	Genetics, Genomics, Informatics (*Medicine)	Genetic Modulation of Hypertrophic Cardiomyopathy Severity	HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute	5R01HL128350-03	5/1/2018	4/30/2019	$498,019
Malik, Kafait	Pharmacology	Angiotensins, Prostaglandins, Adrenergic Interactions	HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute	2R01HL019134-44	6/1/2019	5/31/2020	$643,123
McDonald, Michael, ***Co-PI Francesca-Fang Liao**	Neurology (*Pharmacaology)	Effects of modified erythropoietin on cognitiion and neuropathology	HHS - NIH - NIA - National Institute on Aging and NINDS	5R01NS094595-04	7/1/2018	5/31/2019	$380,606
McDonald, Michael	Neurology	Effects of glycomacropeptide on memory and Alzheimer-related neuropatholog	HHS - NIH - NIA - National Institute on Aging	1R01AG054562-03	4/1/2019	3/31/2020	$380,000
Miller, Duane, ***Li, Wei, * Co-PI**	Pharmaceutical Sciences	Targeting the colchicine site in tubulin for advanced melanoma	HHS - NIH - NCI - National Cancer Institute	5R01CA148706-09	1/1/2019	12/31/2019	$354,527
Miller, Duane, ***Co-Pi Ramesh Narayan**	Pharmaceutical Sciences (*Medicine-hematology)	Discovery and Development of SARDs	GTx, Inc.		10/1/2018	3/31/2019	$287,820
Mozhui, Khyobeni	Preventive medicine	DNA methylation and gene expression study of aging and lifespan differences	HHS - NIH - NIA - National Institute on Aging	1R21AG055841-02	9/15/2018	4/30/2019	$280,000
Neuner, Sarah	Anatomy and Neurobiology	Identification of Genetic Modifiers of Neuronal Deficits and Memory Failure in Alzheimer's Disease.	HHS - NIH - NIA - National Institute on Aging	5F31AG050357-04	7/1/2018	6/30/2019	$44,524
Nowak, Thaddeus	Neurology	Refining stroke QTLs in recombinant inbred BXD mice	HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke	1R03NS108997-01	9/15/2018	6/30/2019	$76,000
Parfenova, Elena	Physiology	Astrocyte functions in neonatal brain	HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke	1R01NS101717-02	7/1/2018	6/30/2019	$332,500
Parfenova, Elena	Physiology	Hydrogen Sulfide in Newborn Cerebral Circulation	HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute	5R01HL042851-28	1/1/2019	12/31/2019	$395,513
Parfenova, Elena	Physiology	Hydrogen Sulfide in Newborn Cerebral Circulation	HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute	5R01HL042851-28 Revised	1/1/2018	12/31/2018	$7,870
Parfenova, Elena	Physiology	Endothelial Vasoprotection by Hypothermia	HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke	1R01NS105655-01A1	9/15/2018	6/30/2019	$424,069
Reiner, Anton	Anatomy and Neurobiology	Neural Control of Choroidal Blood Flow in the Eye	HHS - NIH - NEI - National Eye Institute	5 R01 EY005298-29	9/30/2018	8/31/2019	$380,000
Reiner, Anton	Anatomy and Neurobiology	Progression of Cortical and Basal Ganglia Pathology in Human Huntington's disease and Q175 Huntington's disease Mice	CHDI, Inc.		10/1/2018	9/30/2019	$398,638
Reiter, Lawrence	Neurology	The Evaluating Endosomal Recycling Pathways in Primary Neurons from PWS Individuals	St Jude Children's Research Hospital	181832010-7829655	6/1/2018	5/30/2019	$50,000
Reiter, Lawrence	Neurology	Assessment of epigenetic driven circadian rhythm defects in neurons from individuals with PWS	Foundation for Prader -Willi Research		10/1/2018	9/30/2019	$96,154
Reiter, Lawrence	Neurology	An in vivo chemical screen for seizure suppression in Duplication 15q syndrome.	HHS - NIH - NICHD - Eunice Kennedy Shriver National Institute of Child Health and Human Development	1R21HD091541-02 REVISED	4/1/2018	3/31/2019	$22,800

Lead PI	Department	Project Title	Sponsor	Award Number	Begin Date	End Date	Total Amount
Ross, Jordan	Anatomy and Neurobiology	Fear learning-induced transformations of olfactory bulb odor representations and behavioral generalization	HHS - NIH - NIDCD - National Institute on Deafness and Other Communication Disorders	1F31DC016485-02	7/1/2018	6/30/2019	$44,524
Sakata, Kazuko	Pharmacology	Heat shock factor HSF1 regulation of promoter-specific BDNF transcription	HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke	1R21NS101703-01A1	7/1/2018	6/30/2019	$228,000
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 Stroke	1R21NS110410-01	5/1/2019	4/30/2020	$209,382
Tsao, Jack, ***Co-PI Robert Waters**	Neurology (*Anatomy and Neurobiology)	Investigations into the Etiology of Phantom Limb Sensations and Phantom Limb Pain	HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke	1R01HD094588-01	9/17/2018	6/30/2019	$515,999
Vaithianathan, Thirumalini	Pharmacology	Cellular neurobiology of the retina	State University of New York, Stony Brook (SUNY)	7777/2/1138736 5R01EY00382136	5/12/2018	3/31/2019	$46,924
Vasquez, Valeria	Physiology	Studying prolonged nociceptors activation by TRPV1 combining a spider toxin and C. elegans	US-Israel Binational Science Foundation	2015221	9/1/2018	8/31/2019	$6,080
Williams, Robert	Genetics, Genomics & Informatics	A Unified High Performance Web Service for Systems Genetics and Precision Medicine	HHS - NIH - CSR - National Center for Scientific Review	1R01GTM123489-03	4/1/2019	3/31/2020	$476,764
Williams, Robert	Genetics, Genomics & Informatics	Systems Control of Normal Aging and Alzheimer's Disease	Jackson Laboratory		5/15/2018	4/30/2019	$18,822
Williams, Robert	Genetics, Genomics & Informatics	NIDA Core	HHS - NIH - NIDA - National Institute on Drug Abuse	1P30DA044223-03	8/1/2018	5/31/2019	$763,474
Youngentob, Steven	Anatomy and Neurobiology	Developmental Exposure Alcohol Research Center	Binghamton University State Univeristy of New York (SUNY)	79050-1141746-UTenn	9/1/2018	8/31/2019	$235,400
Zhou, Fuming	Pharmacology	Ion channel mechanisms of striatal dopaminergic motor stimulation	HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke	5R01NS097671-04	5/1/2018	4/30/2019	$332,500
TOTAL							**$17,821,247**

*denotes co-principal investigator

APPENDIX 2

Faculty Publications (PubMed)

FY 2018-2019

Peer-reviewed publications for 2018-2019 (cited in PubMed):

Ahmed, H. A., **Ishrat, T.**, Pillai, B., Bunting, K. M., Vazdarjanova, A., Waller, J. L., Ergul, A., & Fagan, S. C. (2019). Angiotensin receptor (AT2R) agonist C21 prevents cognitive decline after permanent stroke in aged animals-A randomized double- blind pre-clinical study. *Behav Brain Res, 359*, 560-569. doi:10.1016/j.bbr.2018.10.010

Ahmed, H. A., **Ishrat, T.**, Pillai, B., Fouda, A. Y., Sayed, M. A., Eldahshan, W., Waller, J. L., Ergul, A., & Fagan, S. C. (2018). RAS modulation prevents progressive cognitive impairment after experimental stroke: a randomized, blinded preclinical trial. *J Neuroinflammation, 15*(1), 229. doi:10.1186/s12974-018-1262-x

Armstrong, W. E., **Foehring, R. C.**, Kirchner, M. K., & Sladek, C. D. (2019). Electrophysiological properties of identified oxytocin and vasopressin neurones. *J Neuroendocrinol, 31*(3), e12666. doi:10.1111/jne.12666

Arnst, K. E., Banerjee, S., **Chen, H.**, Deng, S., Hwang, D. J., Li, W., & **Miller, D. D.** (2019). Current advances of tubulin inhibitors as dual acting small molecules for cancer therapy. *Med Res Rev, 39*(4), 1398-1426. doi:10.1002/med.21568

Arnst, K. E., Wang, Y., Lei, Z. N., Hwang, D. J., Kumar, G., Ma, D., Parke, D. N., Chen, Q., Yang, J., White, S. W., Seagroves, T. N., Chen, Z. S., **Miller, D. D.**, & Li, W. (2019). Colchicine Binding Site Agent DJ95 Overcomes Drug Resistance and Exhibits Antitumor Efficacy. *Mol Pharmacol, 96*(1), 73-89. doi:10.1124/mol.118.114801

Arzimanoglou, A., Kalilani, L., Anamoo, M. A., Cooney, M., Golembesky, A., Taeter, C., Bozorg, A., Tofighy, A., & **Wheless, J.** (2019). Role of observational studies in supporting extrapolation of efficacy data from adults to children with epilepsy - A systematic review of the literature using lacosamide as an example. *Eur J Paediatr Neurol, 23*(4), 589-603. doi:10.1016/j.ejpn.2019.05.002

Ashbrook, D. G., Roy, S., Clifford, B. G., Riede, T., Scattoni, M. L., **Heck, D. H.**, **Lu, L.**, & **Williams, R. W.** (2018). Born to Cry: A Genetic Dissection of Infant Vocalization. *Front Behav Neurosci, 12*, 250. doi:10.3389/fnbeh.2018.00250

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Babbs, R. K., Kelliher, J. C., Scotellaro, J. L., Luttik, K. P., **Mulligan, M. K.**, & Bryant, C. D. (2018). Genetic differences in the behavioral organization of binge eating, conditioned food reward, and compulsive-like eating in C57BL/6J and DBA/2J strains. *Physiol Behav, 197*, 51-66. doi:10.1016/j.physbeh.2018.09.013

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Bartoli, A., Soleman, J., Berger, A., Wisoff, J. H., Hidalgo, E. T., Mangano, F. T., Keating, R. F., Thomale, U. W., **Boop, F.**, Roth, J., & Constantini, S. (2019). Treatment Options for Hydrocephalus Following Foramen Magnum Decompression for Chiari I Malformation: A Multicenter Study. *Neurosurgery*. doi:10.1093/neuros/nyz211

Benbadis, S. R., Geller, E., Ryvlin, P., Schachter, S., **Wheless, J.**, Doyle, W., & Vale, F. L. (2018). Putting it all together: Options for intractable epilepsy: An updated algorithm on the use of epilepsy surgery and neurostimulation. *Epilepsy Behav, 88S*, 33-38. doi:10.1016/j.yebeh.2018.05.030

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APPENDIX 3

Neuroscience Seminar Speakers

FY 2018-2019

THE NEUROSCIENCE INSTITUTE
UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

NEUROSCIENCE SEMINAR SERIES SCHEDULE

Fall 2018

Thirumalini Vaithianathan, Ph.D. — September 18, 2018
Assistant Professor
Department of Pharmacology
UTHSC

Title: Synaptic Vesicle and Calcium Dynamics at Single Presynaptic Active Zones

Jiang Jianxiong, Ph.D. — September 25, 2018
Associate Professor
Department of Pharmaceutical Sciences
UTHSC

Title: Inflammation in Epilepsy and Glioma: the cart or the horse?

Sally Ann Frautschy, Ph.D. — October 2, 2018
Professor, Department of Medicine & Neurology, UCLA
Research Scientist, VAMC
Host: Dr. Mike McDonald

Title: Transgenic rat model of Alzheimer's to study mixed dementia and role of Eukaryotic Initiation Factor 2 in pathogenesis

Robert Williams, Ph.D. — October 9, 2018
Professor and Chair
Department of Genetics, Genomics, & Informatics
UTHSC

Title: Systems Neurogenetics: Resources, Code, Results

Christiane Linster, Ph.D. October 16, 2018
Professor
Department of Neurobiology & Behavior
Cornell University
Host: Dr. Max Fletcher

Title: A model for cholinergic modulation of olfactory processing: computational, behavioral and electrophysiological studies

Bernhard Luscher, Ph.D. October 30, 2018
Professor
Department of Biology, Biochemistry & Molecular Biology, & Psychiatry
Penn State
Host: Dr. Byron Jones

Title: Modeling depressive and antidepressive brain states: from stress resilience to treatment resistance

Claus Hilgetag, Ph.D. November 13, 2018
Adjunct Associate Professor, Department of Health Sciences, Boston University
Associate Professor, Department of Neuroscience, School of Engineering & Science, Jacobs University, Germany
Host: Dr. Jack Tsao

Title: Understanding Functional Contributions and Interactions in Attention Networks from Computational Modeling and Lesion Analysis

Larry Trussell, Ph.D. November 27, 2018
Professor
Department of Otolaryngology, Neuroscience, Physiology & Pharmacology, & Molecular & Cellular Biosciences
Oregon Health & Science University
Host: Dr. Robert Foehring

Title: Radical transformation of synaptic signals at a cerebellar synapse

Maria Grant, M.D. December 4, 2018
Professor and Endowed Chair
Department of Ophthalmology
University of Alabama, Birmingham

Title: The gut-retinal axis: finding savory solutions for prevention of diabetic retinopathy

Kwanghun Chung, Ph.D. December 11, 2018
Assistant Professor
Department of Chemical Engineering
Institute of Medical Engineering & Science
MIT
Host: Dr. William Armstrong

Title: Holistic Molecular Imaging and Rapid Phenotyping of Complex Biological Systems

THE NEUROSCIENCE INSTITUTE
UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

NEUROSCIENCE SEMINAR SERIES SCHEDULE

Spring 2019

Slav Bagriantsev, PhD — January 29, 2019
Associate Professor
Department of Cellular & Molecular Physiology
Yale University
Host: Drs. Anna Bukiya/Victor Chizhikov

Title: Cellular and Molecular Basis of Mechanosensory Adaptations in Tactile Specialist Birds

Jeremy Herskowitz, PhD — February 12, 2019
Assistant Professor
Department of Neurology & Neurobiology
University of Alabama, Birmingham
Host: Dr. Anton Reiner

Title: TBA

Shin Nagayama, PhD — February 19, 2019
Assistant Professor
Department of Neurobiology & Anatomy
University of Texas
Host: Dr. Max Fletcher

Title: Odor Information Process in Medial/Lateral Symmetrical Maps in the Olfactory Bulb

Firouzeh Sabri, PhD — February 26, 2019
Associate Professor
Department of Physics & Materials Science
University of Memphis

Title: TBA

Veronica Alverez, PhD — March 5, 2019
Senior Investigator
NIH
Host: Dr. Fuming Zhou

Title: TBA

Nathan Crone, PhD — March 12, 2019
Associate Professor
Department of Neurology
Johns Hopkins University
Host: Dr. Abbas Babajani-Feremi

Title: TBA

Jing Zhang, MD/PhD — March 19, 2019
Professor
Department of Pathology & Neuropathology
University of Washington
Host: Dr. Francesca-Fang Liao

Title: TBA

Claire Le Pichon, PhD — March 26, 2019
Investigator
NIH
Host: Dr. Julio Cordero-Morales

Title: Common Stress Response Pathways for Neurodevelopment, Neurodegeneration, and Pain

Chad Samuelson, PhD — April 2, 2019
Assistant Professor
Department of Anatomical Sciences & Neurobiology
University of Louisville
Host: Dr. John Boughter, Jr.

Title: TBA

Yunfei Huang, MD/PhD — April 9, 2019
Professor
Department of Neuroscience & Experimental Therapeutics
Albany Medical College
Host: Dr. Jianxiong Jiang

Title: Microglia and Epilepsy

Keri Martinowich, PhD — April 16, 2019
Lead Investigator
Brain Development Division
Lieber Institute
Host: Dr. Joan Han

Title: TBA

Donald Stein, PhD — April 30, 2019
Director
Brain Research Lab
Department of Emergency Medicine
Emory University
Host: Dr. Tauheed Ishrat

Title: TBA

Medha Pathak, PhD — May 7, 2019
Assistant Professor
Department of Physiology & Biophysics
University of California, Irvine
Host: Dr. Valeria Vasquez

APPENDIX 4

Neuroscience News, Events and Graduate Training Flyer

FY 2018-2019

UTHSC researcher suspects autism, schizophrenia tied to brain circuitry

By Jane Roberts

Published: August 07, 2019 4:00 AM CT

Il Hwan Kim is an assistant professor of anatomy and neurobiology in the University of Tennessee Health Science Center's College of Medicine. He was awarded more than $1.53 million to map and identify neural circuit disfunction in the brain that may be the root cause of behavioral difficulties in psychiatric disorders including schizophrenia, autism and depression. (Patrick Lantrip/Daily Memphian)

As an undergrad several decades ago in South Korea, Il Hwan Kim was fascinated that people diagnosed with schizophrenia, depression or autism all had difficulty interacting with others.

Today, Kim has a 15,000-square-foot lab at the University of Tennessee Health Science Center and $1.53 million grant from the National Institute of Mental Health to zero in on his theory that brain circuity could

be the issue.

"I think there should be a common brain circuit that drives social behavior deficit, which is shared across different psychiatric disorders such as schizophrenia and autism-spectrum disorders," he said.

"It could be caused by candidate genes found in schizophrenia and autism patients."

The trouble is, there isn't technology to isolate brain circuits, the paths of neurons that lace through the brain in such complexity. Kim expects to spend the rest of his life studying one.

"If we want to know the underlying circuit mechanism for abnormal behavior, we need to be able to genetically isolate a circuit out of the extremely complex brain network," he said.

"Using mouse models, I have developed a technique to manipulate a gene within a single brain circuit and found an important brain circuit involved in social behavior," Kim said.

He is injecting a virus embedded with an enzyme that inhibits autism, for instance, into the brains of mice. He then observes their behavior and brain circuitry in recordings aligned in the lab under the same time stamp.

Early results show that the mice are significantly more social with other mice when the gene for autism or schizophrenia is knocked out of the neural circuit.

"I think I have found one of the most important brain circuits involved in social behavior," Kim said.

About 20% of the population experience a diagnosable mental illness at some point. Some are episodic; some last lifetimes.

Another fact that is telling for Kim is that 90% of people who take their own lives showed symptoms of mental illness, a statistic that has not changed since researchers began measuring it in 1965.

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

"I want to see inside the brain instead of what they say. What patients say is not scientific to me. I am a biologist."

Il Hwan Kim

The disorders now are diagnosed by psychiatrists or psychologists who listen as patients describe their symptoms, and check them off against clinical standards.

"I want to see inside the brain instead of what they say," Kim says. "What patients say is not scientific to me. I am a biologist."

If Kim's research produces the results he expects, he says the techniques could be helpful in isolating any of the brain's millions of circuits and any gene or behavioral deficit.

His previous work has been published in Nature Neuroscience and the Journal of Neuroscience.

Kim, assistant professor of anatomy and neurobiology in UT's College of Medicine, came to Memphis in March from Duke University, where he started his work in autism and schizophrenia as a researcher in psychiatry and behavioral science.

In June, UTHSC was notified of the NIMH grant, which extends over four years.

"We recruited a vigorous junior scientist with outstanding potential, who is using cutting-edge research approaches to solve critical questions about brain diseases and mental health," said Matthew Ennis, chair of UT's

Department of Anatomy and Neurobiology.

Despite extensive research in both autism and schizophrenia, "very little is known about how specific types of neurons in the brain contribute to the major symptoms," said Henry Yin, associate professor of psychology and neuroscience at Duke and one of Kim's collaborators.

"Previous work has suggested clues about where in the brain abnormalities might be found, but little is known about what is happening in these brain areas," Yin said.

"What sets Kim apart," he said, "is his ability to integrate many different approaches and levels of analysis, from cellular/molecular mechanisms to behavior.

"This type of versatility is rare in science, which is dominated by specialists that usually focus only on a single approach," Yin said. "His work represents a new generation of 'integrative' neuroscientists who are able to zoom in and out easily when analyzing the brain."

TOPICS

IL HWAN KIM UTHSC AUTISM SCHIZOPHRENIA

Jane Roberts

Longtime journalist Jane Roberts is a Minnesotan by birth and a Memphian by choice. She's lived and reported in the city more than two decades.

Tissue Clearing and Light Sheet Fluorescence Microscopy (LSFM) Workshop

Written by Natalie Smith | December 11, 2018

Join the Advanced Animal Imaging (AAI) Core and the Office of Research as we welcome Kwanghun Chung, PhD, Assistant Professor, Department of Chemical Engineering and the Institute for Medical Engineering and Science (IMES); and Principal Investigator, Picower Institute for Learning and Memory, at the Massachusetts Institute of Technology. Dr. Chung will deliver an exciting workshop entitled, "From Samples to Data: Engineering Principles and Practical Considerations for Holistic Tissue Imaging and Phenotyping." The workshop is open to all faculty, staff, and students and light refreshments will be served! More details can be found below:

When: Tuesday, December 11, 2018, at 2:00 p.m.

Location: Cancer Research Building (CRB) Auditorium -Room 114

This event is being made possible by the Light Sheet Fluorescence Microscopy (LSFM) unit in the Advanced Animal Imaging (AAI) Core and the Office of Research.

UTHSC's Jablonski Wins $1.53M Award to Study Glaucoma Mechanisms and Develop Targeted Therapies

Written by Sarah Ashley Bloch | March 6, 2019

Glaucoma is the leading cause of irreversible blindness in the world and affects more than three million people in the United States each year. Currently, there is no cure for this crippling disease, only the option to treat one's symptoms. Monica M. Jablonski, PhD, professor in the Department of Ophthalmology in the College of Medicine at the University of Tennessee Health Science Center (UTHSC), was recently awarded over $1.53 million from the National Institutes of Health (NIH) to help uncover the underlying mechanisms that cause glaucoma and develop targeted therapies to preserve retinal health in patients at risk for glaucoma.

Dr. Monica Jablonski

"There are FDA-approved drugs currently on the market that target various conditions of the eye," Dr. Jablonski said. "They do not address the genetics of glaucoma, however. Moreover, we do not have a thorough understanding of glaucoma because its genetic basis is so diverse and it represents a family of age-related disorders."

A large body of research has shown that eye pressure, also known as intraocular pressure (IOP), is a major risk factor for optic nerve damage and loss of vision in glaucoma. Dr. Jablonski and her collaborators have recently identified a gene that modulates IOP and are using a similar approach to determine what regulates damage to the optic nerve.

"We have had recent success using a combined genetic approach and are now testing a new targeted treatment strategy for blocking IOP elevation that can lead to retinal ganglion cell death," Dr. Jablonski said. "Our goal is to be able to define novel genes and molecular networks that underline glaucoma-associated characteristics while also providing unique glaucoma models for future analysis. The outcomes of our study are expected to fundamentally advance the field of glaucoma disease mechanisms and enable targeted therapeutic development."

Directly linked to the successful acquirement of her NIH grant is a seed funding award created by the Vice Chancellor for Research at UTHSC, Steven R. Goodman, PhD. The preliminary data she collected with the help from her Collaborative Research Network (CORNET) Award was "key to her winning her current NIH award," she said.

"Sometimes you need extra data to make your work something that is really cool," said Dr. Jablonski. "My CORNET Award allowed me to take my data to the next level. UTHSC researchers are very lucky to have this level of support from our administration."

Dr. Jablonski's project titled, "Genetic Modulators of Glaucoma," is being funded for four years.

Alex Dopico, MD, PhD, of UTHSC Investigating Mechanisms and Novel Drug Therapies to Control Vascular Function

Written by Sarah Ashley Bloch | May 8, 2019

Alex Dopico, MD, PhD, University Distinguished Professor and chair of the Department of Pharmacology at the University of Tennessee Health Science Center (UTHSC), has been awarded over $2.4 million from the National Heart, Lung, and Blood Institute (NHLBI) to explore the mechanisms by which our bodies regulate arterial diameter and thus develop new drug therapies to control vascular diseases.

Dr. Alex Dopico (Photo by Allen Gillespie/UTHSC)

The human body naturally produces various types of steroids, most in the form of hormones, which have a wide variety of roles and functions. Throughout our lives, our hormone levels will naturally fluctuate like during puberty for example. Dr. Dopico's research is specifically examining how endogenous steroids (STs) interact with certain ion channels (a type of proteins found in cells) to regulate vascular diameter.

"Lipids, in particular steroidal hormones, control cardiovascular function," Dr. Dopico said. "Their direct interactions with certain ion channels dictate how wide or narrow artery diameter is. An abnormal artery diameter plays a significant role in diabetes, hypertension, aging, and stroke."

Dr. Dopico and his collaborators Anna Bukiya, PhD, associate professor of Pharmacology at UTHSC, and Abby Parrill-Baker, PhD, Interim Dean and Professor at the University of Memphis, have developed new pharmacological agents which will be used to investigate the role specific ion channels play in controlling arterial diameter. They will be paying close attention to the vascular actions of STs to see if these novel agents counteract or synergize modulation of ion channel and thus, arterial function.

"Our focus on the brain and other surrounding arteries is relevant to conditions where two arterial territories are affected by disease, such as hypertensive encephalopathy," Dr. Dopico said. "The ultimate goal is to pinpoint a direct interaction between endogenous steroids and ion channels that control artery diameter, and use this information to design new drugs. The data we collect is a significant first step in the creation of future cardiovascular medications for diseases such as stroke and hypertension, or conditions that may require control of steroid action on the vasculature like hyperfunction of the adrenal glands or during estrogen therapy."

Dr. Dopico's project titled, "Regulation of Arterial Diameter Through Specific Sensing of Endogenous Steroids and Novel Nonsteroidal Analogs by BK Channel Subunits," is being funded for four years.