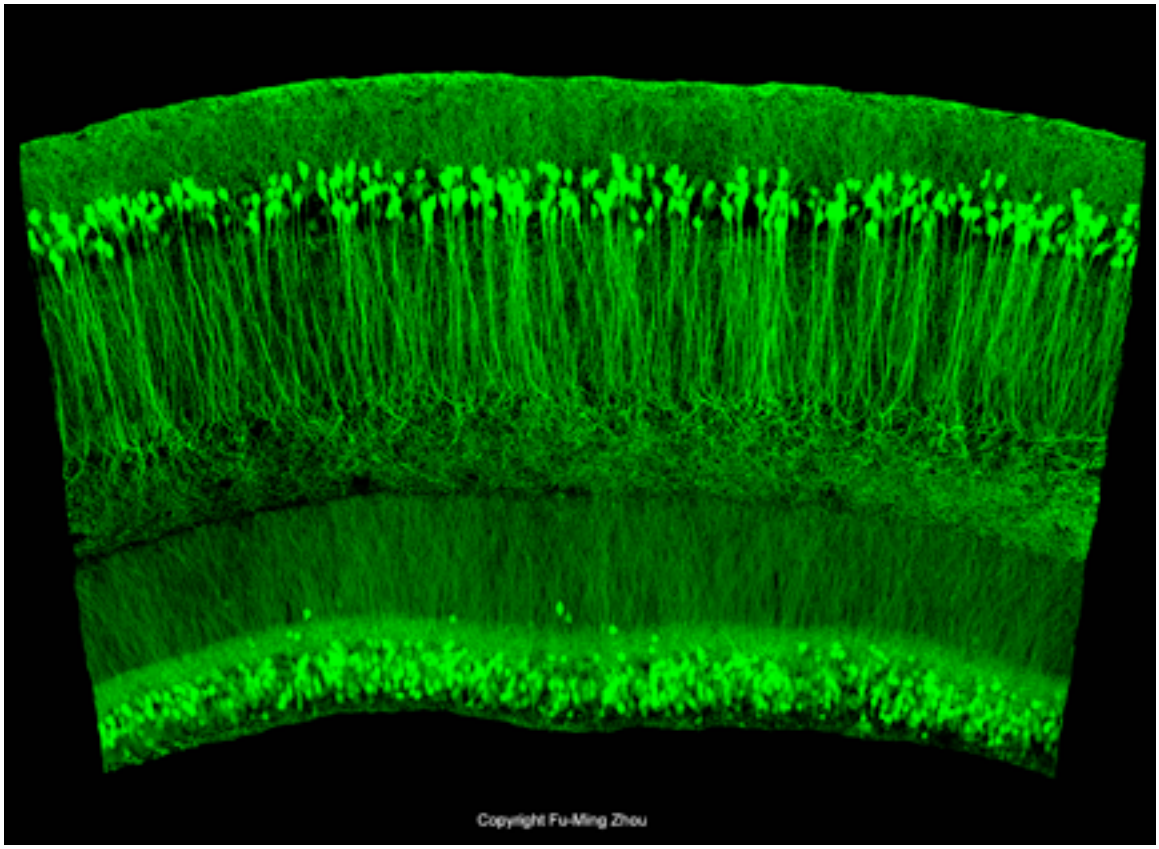
THE
NEUROSCIENCE INSTITUTE
UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

Neuroscience Center of Excellence



Annual Report to the

Tennessee Higher Education Commission

Fiscal year 2013 (7/1/2012-6/30/2013)

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I. 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:	Shannon Guyot
Program Manager:	Brandy Fleming

Neuroscience Executive Committee:

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

Eldon Geisert, Ph.D., Professor and Director, Center for Vision Research, Department of Ophthalmology

Mark LeDoux, M.D., Ph.D., Professor, Department of Neurology

Charles Leffler, Ph.D., Professor, Department of Physiology

Susan E. Senogles, Ph.D., Associate Professor, Department of Molecular Sciences

Jeff Steketee, Ph.D., 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

Organizational Structure:

The 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, currently David Stern, M.D. Physically the NI is housed within twelve different departments in the College of Medicine and some other UT departments, 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, Christian Brothers University, and at the University of Memphis.

Dr. Armstrong supervises Brandy Fleming, who is our Program Manager and also functions as our IT specialist. Ms. Fleming and Dr. Armstrong supervise our administrative assistant Shannon Guyot. Ms. Guyot organizes the seminar series including all travel arrangements, does NI official correspondence, and also works ¼ time in the Imaging Center. The Neuroscience Imaging Center is managed by Amanda Preston, Ph.D. Dr. Preston reports to Dr. Armstrong and supervises 2 part-time histologists, Zerriyan Jackson and Shannon Guyot. Dr. Andrea Elberger manages the Bio-Rad Confocal Microscope and reports to Dr. Armstrong. Dr. Armstrong serves as overall director of the Imaging Center.

II. BUDGET (see Schedule 7, page 6)

A. FY 2013. The FY 2013 appropriated budget for the UTNI was $600,094. We carried forward $261,165 from the previous year for a total budget of $861,259. This carryover continued to partly reflect 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. In addition, some research projects were funded with start dates from the past FY and therefore are carried over. However, the main reason for this year's carryover was the anticipation of assisting with new Neuroscience hires at UTHSC. While this did not happen during this fiscal year, it appears to be imminent in the coming and following fiscal years (see below).

This past FY, we expended $526,152 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, the Director of the BioRad Confocal Microscope, a full-time Program Manager /IT specialist, a full time Administrative Specialist/histologist, full time Technical Director of Imaging Center, one other part time histologist in the Imaging Center, matching support for 7 graduate student stipends and 8 matching postdoctoral fellowships (see below).

Students: We awarded matching funds for 7 graduate stipends to PIs with Neuroscience track graduate students ($84,092). The mentors were located in the departments of Anatomy and Neurobiology, Neurology, Ophthalmology and Pharmacology

Postdoctoral Support: We provided matching funds for 8 postdoctoral fellows, at ~$15,000 each ($137,311). The NI Mentors are located in the departments of Anatomy and Neurobiology, Neurology, and Pharmacology.

Neuroscience Imaging Center: This past year we hired Amanda Preston, Ph.D. to become the Technical Director of the Imaging Center. Dr. Preston came to us from St. Jude Children's Research Hospital and is highly skilled in light and electron microscopy as well as histology. We also pay another part-time histologist, Zerriyan Jackson, and our administrative assistant, Shannon Guyot, also works ¼ time in the Imaging Center. We supplement our cost-recovery program to keep user fees low, helping to pay the service contracts on our JEOL 2000 Electron Microscope, our BioRad Confocal Microscope, the Neurolucida workstation, and soon,

the Zeiss 710 confocal microscope, the warranty of which ends May of 2013. This year our cost-recovery program invoiced $52,757, which paid for our part-time histologists and a portion of Dr. Preston's salary, and provided fees against the $16,500 paid in service contracts for the JEOL 2000. We continued our contract service with the UTHSC Pathology Group for EM use.

Neuroscience Behavioral Core: We purchased a video camera ($558) for behavioral monitoring in the 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 low cost of maintenance (PIs provide their own technicians to use the equipment), NI has not yet instituted fee for service in this facility. However, this may change as we look towards upgrading and adding equipment in the future.

Seminars and Symposia: Additional funds went to support travel/lodging/meals ($22,625) and honoraria ($3,700) for the Neuroscience Seminar series, and for a joint symposium with the Urban Child Institute entitled: "Train Your Brain: Early Eating Habits Affect Brain Development and Childhood Obesity" (**see Appendix 4**).

Research Projects: We did not award new research project grants during FY 2012-2013 in order to insure sufficient startup funds for our two new faculty. We did supplement the TBI project initiated by Dr. Reiner ($2,000), and the autism protein-screening project of Larry Reiter and Kathryn McVicar ($2,550).

Undergraduate Fellowships: NI supported four undergraduate Neuroscience Merit Fellows (total, $16,000) for summer research.

Travel Awards: $2,953 in travel awards for graduate students and travel support for faculty were awarded.

B. FY 2014. We will carryover $299,484 to the coming fiscal year, and have been appropriated $621,729 for a total of $921,213. Here is a breakdown of the major anticipated projects for FY2014:

Students: For the coming year, we have awarded matching funds for 6 graduate stipends to PIs with Neuroscience track graduate students. Mentors are located in the departments of Anatomy and Neurobiology, Neurology, Ophthalmology, Pharmacology and Pharmaceutical Sciences. The NI match is ~$13,000 a piece for 5 of these (~$65,000), and $6,650 for one student, making an expected total of ~$71,650.

Postdoctoral Support: We will provide matching funds for 8 postdoctoral fellows (~$120,000 total) for the coming year. The NI mentors are located in the departments of Anatomy and Neurobiology, Neurology, and Pharmacology.

Neuroscience Imaging Center: We will pay the service contracts on the JEOL 2000 ($16,800), and laser replacement for the BioRad 2000 if necessary (~$10,000), and for the service contract for the Zeiss 710 Confocal ($19,225, contract submitted). Our current Neurolucida software contract is good for one more year, but we will need to spend $1,098 to replace the Z-axis motor (order submitted).

Neuroscience Behavioral Core: We will continue to support the Behavioral Core in FY 2014, 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 initiated and approved.

Neuroscience Histology Core: This past year we dedicated two vacated rooms in the Imaging Core to a new Histology Core facility. Two cryostats, a vibratome, a sledge microtome, and rotary microtome were donated to this facility. We expect to spend money repairing the cryostats, both of which need service, but do not know yet how much this will entail. At this point, we will offer use of the facility free of charge, but may install fee for service depending upon equipment maintenance.

NI Faculty: We will continue the administrative supplements provided to Drs. Armstrong, Reiner, and Elberger. However if the use of the BioRad Confocal continues to wane, Dr. Elberger's administrative support will be terminated should we take this machine out of service. This past year, Dean Stern of the COM approved a search for two lower level positions, and this search generated two excellent new hires in the Department of Anatomy and Neurobiology. NI committed $189,000 to Dr. Catherine Kaczorowski and $175,000 to Dr. Victor Chizhikov to be spent over the next 4-5 years. Dr. Kaczorowski arrived Aug. 1, 2013, and Dr. Chizikov is expected to arrive Oct. 1, 2013. Additional funds were provided by the COM and the Center for Integrative and Translational Genomics headed by Dr. Rob Williams. The Dean has given permission to recruit a third assistant professor for FY2014 and this search has commenced. NI will commit $150,000 toward this new recruit in Neurogenetics research. NI gave permission to Drs. Chizhikov and Kaczorowski to use ~$90,000 of their seed money in FY2014 if needed. Their remaining funds as well as those for the expected new recruit will be distributed over the next 4-5 years.

Research Projects and Bridge Funding. While our priority for FY2014 is assisting the new NI hires, we will have funds to offer some bridge support for faculty trying to renew grants and others seeking pilot data for new projects.

Seminar Series and Community Outreach: We will offer our weekly Neuroscience Seminar series and will also sponsor a Neuroscience Symposium in the course of the academic year. We will continue to work with the Urban Child Institute to fund community outreach activities such as Brain Awareness Week and sponsor a symposium with them. In addition, NI has committed $5,000 to partner with the Urban Child and the University of Memphis to help pay for the development of a mobile kiosk with an interactive graphics screen which informs users about the functions of different parts of the brain and the importance of certain activities to their development, as well as those activities which impair brain development. This kiosk is aimed at parents and child care workers and will be placed at 3 different venues over the next 2 years- Pink Palace Museum, Le Bonheur Children's Hospital, and here at the University of Tennessee Health Science Center. We will fund the summer Undergraduate Neuroscience Merit Fellowships to Rhodes and Christian Brothers University students who are doing research projects in Neuroscience towards fulfilling their degree requirements.

Schedule 7

CENTERS OF EXCELLENCE/CENTERS OF EMPHASIS
ACTUAL, PROPOSED, AND REQUESTED BUDGET

Institution UT Health Science Center **Center** Neuroscience Institute

	FY 2012-13 Actual			FY 2013-14 Proposed			FY 2014-15 Requested		
	Matching	Appropr.	Total	Matching	Appropr.	Total	Matching	Appropr.	Total
Expenditures	947,749	561,775	**1,509,523**	1,388,069	821,213	**2,209,282**	1,420,711	752,815	**2,173,526**
Salaries									
Faculty	413,050	39,225	**452,275**	449,801	42,715	**492,516**	463,295	43,996	**507,291**
Other Professional	294,391	202,191	**496,582**	352,679	239,661	**592,340**	363,259	160,000	**523,259**
Clerical/ Supporting		52,044	**52,044**		58,896	**58,896**	0	60,663	**60,663**
Assistantships	87,500	118,252	**205,752**	87,500	91,000	**178,500**	90,125	91,000	**181,125**
Total Salaries	**794,941**	**411,712**	**1,206,653**	**889,980**	**432,272**	**1,322,252**	**916,679**	**355,659**	**1,272,339**
Longevity	**5,610**	**3,401**	**9,011**	**6,732**	**4,081**	**10,813**	**6,934**	**4,204**	**11,138**
Fringe Benefits	147,198	111,039	**258,237**	191,357	144,574	**335,931**	197,098	148,911	**346,009**
Total Personnel	**947,749**	**526,152**	**1,473,900**	**1,088,069**	**580,927**	**1,668,996**	**1,120,711**	**508,774**	**1,629,485**
Non-Personnel									
Travel		25,429	**25,429**		30,000	**30,000**		31,000	**31,000**
Software		152	**152**			**0**			**0**
Books & Journals		0	**0**			**0**			**0**
Other Supplies		15,965	**15,965**		19,486	**19,486**		21,691	**21,691**
Equipment		0	**0**			**0**			**0**
Maintenance		16,754	**16,754**		35,800	**35,800**		38,000	**38,000**
Scholarships		2,566	**2,566**			**0**			**0**
Consultants		7,700	**7,700**		10,000	**10,000**		10,000	**10,000**
Renovation		0	**0**			**0**			**0**
Other (Specify)			**0**			**0**			**0**
Imaging Center Recovery		(37,443)	**(37,443)**		(60,000)	**(60,000)**		(61,800)	**(61,800)**
Startup		0	**0**	300,000	200,000	**500,000**	300,000	200,000	**500,000**
Support		4,500	**4,500**		5,000	**5,000**		5,150	**5,150**
Total Non-Personnel	**0**	**35,623**	**35,623**	**300,000**	**240,286**	**540,286**	**300,000**	**244,041**	**544,041**
GRAND TOTAL	**947,749**	**561,775**	**1,509,523**	**1,388,069**	**821,213**	**2,209,282**	**1,420,711**	**752,815**	**2,173,526**
Revenue									
New State Appropriation		600,094	**600,094**		621,729	**621,729**		652,815	**652,815**
Carryover State Appropriation		259,963	**259,963**		299,484	**299,484**		100,000	**100,000**
New Matching Funds	947,749		**947,749**	1,388,069		**1,388,069**	1,420,711		**1,420,711**
Carryover from Previous Matching Funds		1,202	**1,202**			**0**			**0**
Total Revenue	**947,749**	**861,259**	**1,809,008**	**1,388,069**	**921,213**	**2,309,282**	**1,420,711**	**752,815**	**2,173,526**

III. EXTRAMURAL FUNDING OF NEUROSCIENCE FACULTY

The UT Neuroscience Institute is a concentrated, interdepartmental Neuroscience program. For FY2012-2013, as a Neuroscience department (all but one funded member is a Neuroscientist), Anatomy and Neurobiology (7 funded members) ranked ***17th among public university medical schools in NIH funding, and 34th overall (from a total of 43).*** Other participating NI departments that are well ranked include Physiology (4 funded NI members), which was ranked ***9th among public medical schools and 18th overall*** (of 87), and Pharmacology (7 funded members), which was *ranked* ***34th and 54th***, respectively (of 97) (Statistics from Blue Ridge Institute for Medical Research). 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 **$12,477,583.** This reflects a significant loss, reflective of the overall losses at UTHSC the past fiscal year due to the difficulties in NIH funding.

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.

IV. HISTORY OF THE NEUROSCIENCE INSTITUTE

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 those associated with Brain Awareness Week. The Director from 1985-2002 was Dr. Steven T. Kitai. Dr. David Smith was named director from 2002-2006 (deceased, Sept. 2006), and Dr. William Armstrong has been director since 2006.

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, Christian Brother's University and the Urban Child Institute. The interdepartmental nature of the program and the collaborations it fosters provide the cross-disciplinary environment necessary for high quality neuroscience research, training and patient care.

Page 2 above lists the members of the Executive Committee. This year Dr. William Pulsinelli, former Chair of Neurology, has stepped down as he approaches retirement. The Director and Co-Director frequently interact

with Executive Committee members and consult with these members regarding research and postdoctoral awards. In these cases, applications are solicited and each application is read and ranked by at least 3 members of the committee. Final rankings are compiled by the Director and Co-Director and passed back to the Executive Committee for approval before funding.

V. FACULTY OF THE NEUROSCIENCE INSTITUTE

The Neuroscience Institute is currently comprised of 88 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.

Department of Anatomy and Neurobiology

William E. Armstrong, Ph.D., Professor and NI Director
John D. Boughter, Jr., Ph.D. Associate Professor
Joseph C. Callaway, Ph.D., Associate Professor
Angela Cantrell, Ph.D., Assistant Professor
Alessandra d'Azzo, Ph.D., Affiliated Professor (St. Jude)
Hong Wei Dong, Ph.D., Assistant Professor
Michael A. Dyer, Ph.D., Affiliated Professor (St. Jude)
Andrea J. Elberger, Ph.D., Professor
Matthew Ennis, Ph.D., Professor and Chair
Malinda E. C. Fitzgerald, Ph.D., Adjunct Professor (Christian Brothers Univ.)
Max Fletcher, Ph.D., Assistant Professor
Robert C. Foehring, Ph.D., Professor
Kristin Hamre, Ph.D., Associate Professor
Detlef Heck, Ph.D., Associate Professor
Scott Heldt, Ph.D., Assistant Professor
Paul Herron, Ph.D., Associate Professor
Marcia G. Honig, Ph.D., Professor
Eldridge F. Johnson, Ph.D., Professor
*Catherine Kaczorwoski, Ph.D., Assistant Professor
Hitoshi Kita, Ph.D., Professor
Lu Lu, Ph.D., Associate Professor

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

Guy Mittleman, Ph.D., Adjunct Associate Professor (Univ. Memphis)

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

Randall J. Nelson, Ph.D., Professor

Guillermo Oliver, Ph.D., Affiliated Associate Professor (St. Jude)

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

Reese S. Scroggs, Ph.D., Associate Professor

Richard J. Smeyne, Ph.D., Affiliated Associate Professor (St. Jude)

Michael Taylor, Ph.D., Affiliated Assistant Professor (St. Jude)

J. Paul Taylor, M.D., Ph.D., Affiliated Associate Professor (St. Jude)

Robert S. Waters, Ph.D., Professor

Robert W. Williams, Ph.D., UT-Oak Ridge National Laboratory Governor's Chair in Computational Genomics Professor

Stanislav Zahkarenko, Ph.D. Affiliated Associate Professor (St. Jude)

Jian Zuo, Ph.D., Affiliated Professor (St. Jude)

Department of Biochemistry and Cellular and Molecular Biology, UT Knoxville

Rebecca A. Prosser, Ph.D., Professor

Department of Medicine

Tai-June Yoo, M.D., Ph.D., Professor

Department of Molecular Sciences

Susan E. Senogles, Ph.D., Professor

Department of Neurology

Dominic M. Desiderio, Ph.D., Professor

Michael Jacewicz, M.D., Professor

Mark S. LeDoux, M.D., Ph.D., Professor

Michael C. Levin, M.D., Professor

Michael McDonald, Ph.D., Associate Professor

Thaddeus S. Nowak, Ph.D., Professor

Ronald F. Pfeiffer, M.D., Professor

William A. Pulsinelli, M.D., Ph.D., Semmes-Murphey Professor and Chair

Lawrence T. Reiter, Ph.D., Associate Professor

Department of Neurosurgery

Frederick Boop, M.D., Professor and Chair

Department of Ophthalmology

Edward Chaum, M.D., Ph.D., Plough Foundation Professor

Eldon E. Geisert, Ph.D., Professor

Alessandro Iannaccone, M.D., Associate Professor

Monica M. Jablonski, Ph.D., Associate Professor

Jena Steinle, Ph.D., Associate Professor

Dianna A. Johnson, Ph.D., Hiatt Professor

Department of Pathology

F. Curtis Dohan, Jr., M.D., Associate Professor

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

Andrew Papanicolaou, Ph.D., Professor, Pediatrics, Le Bonheur

Kanwaljeet J.S. Anand, M.D., Ph.D., Professor, Pediatrics, Le Bonheur

Masanori Igarashi, M.D., Associate Professor, Pediatric Neurology, Le Bonheur

Kathryn McVicar, M.D., Assistant Professor, Pediatric Neurology, Le Bonheur

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

Robin L. Morgan, M.D., Assistant Professor, Pediatric Neurology, Le Bonheur

Freedom F. Perkins, Jr., M.D., Assistant 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

Department of Pharmacology

Suleiman W. Bahouth, Ph.D., Professor

Hao Chen, Ph.D., Assistant Professor

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

Francesca-Fang Liao, Ph.D., Associate Professor

Kafait U. Malik, Ph.D., Professor

Kazuko Sakata, Ph.D., Assistant Professor

Shannon G. Matta, Ph.D., Professor

Burt Sharp, M.D., Van Vleet Professor

Jeffery Steketee, Ph.D., Professor

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

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

Department of Physiology

Ioannis Dragatsis, Ph.D., Associate Professor

Jonathan Jaggar, Ph.D., Professor

Charles W. Leffler, Ph.D., Professor

Kristen M.S. O'Connell, Ph.D., Assistant Professor

Helena Parfevona, Ph.D., Professor

Department of Psychiatry

Kenneth Sakauye, M.D., Professor and Vice Chair

Department of Medicine/Cardiology

Syamal Bhattacharya, Ph.D., Professor

University of Memphis

Ramin Homayouni, Ph.D., Adjunct Associate Professor, Neurology

Guy Mittleman, Ph.D., Adjunct Professor, Anatomy and Neurobiology

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

Guillermo Oliver, Ph.D., Associate Professor

Richard Smeyne, Ph.D., Associate Professor

Michael Taylor, Ph.D., Assistant Professor

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

Stanislav Zakharenko, Ph.D., Associate Professor
Jian Zuo, Ph.D., Professor

VI. AREAS OF NEUROSCIENCE RESEARCH

The research programs of the faculty of NI are diverse, representing most areas of modern neuroscience research. Within the program are several strong areas of research focus, where in many instances basic scientists and clinical investigators interact to investigate the mechanisms of diseases of the nervous system. In 2002 participating faculty organized into eight research focus groups, within which there is considerable intellectual interaction and collaborative research. In spring of 2006, 3 of these focus groups were expanded to include a Translational component emphasizing interaction between clinical and basic research groups.

Neurological and Neurodegenerative Disorders

Neurological diseases include disorders of the nervous system arising from nervous system malfunction or degeneration. Among these are the movement disorders (which include Parkinson's disease, essential tremor, Huntington's disease, dystonia, myoclonus, Tourette's syndrome, paroxysmal dyskinesias, drug-induced dyskinesias, restless legs syndrome, spinocerebellar ataxias, spasticity, multiple system atrophy, and progressive supranuclear palsy), dementing diseases (notably Alzheimer's), primary motor diseases (such as amyotrophic lateral sclerosis and multiple sclerosis), and diseases of neurotransmission abnormality (such as epilepsy). The integration of genetic, cellular, and physiological information will be required to unravel the pathophysiology of each disorder and improve therapeutics. Due to aging of our population, movement disorders and dementing diseases will place an enormous and increasing financial burden on society. Investigations by this group will play an important role in the breakthroughs needed to understand and treat these diseases. Current areas of focus include: cellular and network physiology of basal ganglia in the context of Parkinson's disease, neurobiology of neuronal dysfunction and death in Huntington's disease, and molecular biology of synaptogenesis in dystonia. Researchers also study the potential protective effects of hypothermia on cerebral ischemic insults, Alzheimer's disease, and molecular mimicry in immune-mediated neurological disease. * Designates new member.

Faculty:

M. LeDoux (head)	*Neurology*	T. Nowak	*Neurology*
A. Cantrell	*Anat. & Neurobiology*	A. Papanicolaou	*Ped. Neurology/Le Bonheur*
I. Dragatsis	*Physiology*	R. Pfeiffer	*Neurology*
E. Geisert	*Ophthalmology*	W. Pulsinelli	*Neurology*

R. Homayouni	*Neurology/U Memphis*	A. Reiner	*Anat. & Neurobiology*
M. Jacewicz	*Neurology*	L. Reiter	*Neurology*
*C. Kaczorowski	*Anat. & Neurobiology*	R. Smeyne	*Anat. & Neurobiology/St. Jude*
H. Kita	*Anat. & Neurobiology*	J. Wheless	*Ped. Neurology/Le Bonheur*
F-F. Liao	*Pharmacology*		
R. Nelson	*Anat. & Neurobiology*		

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. Whether a neuron fires at any given moment is determined by the interaction of intrinsic membrane properties with synaptic inputs. Research in this group focuses on these properties from several viewpoints. At the molecular level, studies determine the genetic capacity for producing proteins related to specific ion channels and neurotransmitter receptors. Expression patterns of the proteins in classes of neurons impart a unique signature of ion channels and receptors. Electrophysiological recordings can reveal the properties of ionic currents underlying particular patterns of firing, the modulation of these currents by neurotransmitters, the precise properties of synaptic input, and the plasticity of neuronal activity. At a more global level, neuronal activity can be studied within an intact neuronal network and correlated with behavior. The common goal of this group is to understand how and why neuronal activity occurs in both normal tissue and in neurological disorders.

Faculty:

R. Foehring (head)	*Anat. & Neurobiology*	D. Heck	*Anat. & Neurobiology*
W. Armstrong	*Anat. & Neurobiology*	H. Kita	*Anat. & Neurobiology*
J. Callaway	*Anat. & Neurobiology*	R. Nelson	*Anat. & Neurobiology*
A. Cantrell	*Anat. & Neurobiology*	R. Scroggs	*Anat. & Neurobiology*
A. Dopico	*Pharmacology*	S. Tavalin	*Pharmacology*
M. Ennis	*Anat. & Neurobiology*	R. Waters	*Anat. & Neurobiology*
*C. Kaczorowski	*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. To understand sensory processing, we need to address the genetic basis of sensory function, the coding of information by individual sensory neurons at several levels of the nervous

system, from peripheral receptors to cerebral cortex, and the role of the environment in shaping the responsiveness of these neurons through mechanisms of neuronal plasticity. Interactions between somatosensory and motor cortices, the effects of early alcohol exposure on sensory and motor processing, the control over gustatory information processing by descending influences from limbic forebrain, the genetics of taste processing, the processing of nociceptive (pain) information, and synaptic processing in the olfactory bulb are all areas of research addressed by this group.

Faculty:

M. Ennis (head)	*Anat. & Neurobiology*	R. Nelson	*Anat. & Neurobiology*
J. Boughter	*Anat. & Neurobiology*	R. Scroggs	*Anat. & Neurobiology*
M. Fletcher	*Anat. & Neurobiology*	R. Waters	*Anat. & Neurobiology*
C.-X. Li	*Anat. & Neurobiology*		

Vision and Retina

We rely primarily on our sight to guide us through the world. Our eyes provide the major sensory input to the brain, accounting for one-third of the sensory axons entering the human nervous system. 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. The current program reflects a comprehensive and synergistic approach to important fundamental questions of eye genetics and development and the application of this new strategy to the treatment of disease. These investigators seek to understand normal and abnormal ocular development and how genes control these events. There is an active program in the application of molecular techniques to the modulation of retinal cell growth and cellular responses to injury using gene therapy. Current areas of focus include prevention and treatment of eye diseases and disorders, eye genetics in development and childhood diseases, retinal degenerative diseases, anterior segment disorders, response of the retina and optic nerve to injury, and genetic control of eye development. The primary goal of the vision and retina research group is to provide a framework for effective communications between research laboratories effecting eventually the translation of basic research to clinical applications.

Faculty:

E. Geisert (head)	*Ophthalmology*	D. Johnson	*Ophthalmology*
E. Chaum	*Ophthalmology*	A. Reiner	*Anat. & Neurobiology*
M. Dyer	*Anat. & Neurobiology/St. Jude*	J. Steinle	*Ophthalmology*
M. Fitzgerald	*Anat. & Neurobiology/CBU*	R. Williams	*Anat. & Neurobiology*

A. Iannaccone	*Ophthalmology*	J. Zuo	*Anat. & Neurobiology/St. Jude*
M. Jablonski	*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. The group is highly collaborative and includes a significant contingent of neuroscientists from St. Jude Children's Research Hospital (primarily the Departments of Developmental Neurobiology and Genetics). Current research tends to rely heavily on genetically defined lines of rodents. Topics of this research interest include: control of cell cycling and cell death in the brain, control of axon outgrowth and neurotrophic interactions during neural development, the formation, elimination and stabilization of synapses, functional maturation and environmental/drug sensitivity of the developing nervous system, genetics of disease vulnerability and outcome, and mechanisms of cell migration in the developing brain.

Faculty:

R. Williams (head)	*Anat. & Neurobiology/Pediatrics*	P. McKinnon	*Anat. & Neurobiology/St. Jude*
J. Boughter	*Anat. & Neurobiology*	G. Mittleman	*Anat. & Neurobiology/U Memphis*
A. d'Azzo	*Anat. & Neurobiology/St. Jude*	J. Morgan	*Anat. & Neurobiology/St. Jude*
I. Dragatsis	*Physiology*	G. Oliver	*Anat. & Neurobiology/St. Jude*
A. Elberger	*Anat. & Neurobiology*	A. Reiner	*Anat. & Neurobiology*
K. Hamre	*Anat. & Neurobiology*	L. Reiter	*Neurology*
R. Homanyouni	*Neurology/U Memphis*	B. Sharp	*Pharmacology*
M. Honig	*Anat. & Neurobiology*	R. Smeyne	*Anat. & Neurobiology/St. Jude*
L. Lu	*Anat. & Neurobiology*	R. Waters	*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. Research is currently being conducted using both *in vivo* and *in vitro* models. Molecular, cellular, neuroanatomical, neurophysiological, neurochemical, morphological and behavioral approaches are all

being used to study the neuroscience of mental and addictive disorders. Research efforts are currently focused on depression and antidepressants and drugs of abuse, including cocaine, amphetamine, nicotine, ethanol and toluene. Several collaborative efforts currently exist within the group, including studies on drug effects on ion channels, drug-receptor adaptations, developmental neuroplasticity and interactions between stress and drugs.

Faculty:

J. Steketee (head)	*Pharmacology*	S. Matta	*Pharmacology*
H. Chen	*Pharmacology*	K. Sakata	*Pharmacology*
A. Dopico	*Pharmacology*	B. Sharp	*Pharmacology*
A. Elberger	*Anat. & Neurobiology*	S. Tavalin	*Pharmacology*
K. Hamre	*Anat. & Neurobiology*	F. Zhou	*Pharmacology*
S. Heldt	*Anat. & Neurobiology*		

Neural Cell Signaling

The function, growth and survival of neural cells are regulated by extracellular and intracellular signals. One example is the release of neurotransmitter from a presynaptic neuron, which is sensed by the postsynaptic neuron via receptors that recognize specific neurotransmitter molecules. This information is relayed to the cell's interior by a series of elaborate and interdependent signaling intermediates and results in a change in the cell in response to its environment. This diverse group of researchers is investigating those processes that are collectively referred to as signal transduction using neural or neural-derived cell systems. Indeed, most drugs that are currently used in the management of neurological disorders, such as ADHD, depression, schizophrenia, Parkinson's disease and others, exert their effects on signaling components. The goal of this group is to understand the involvement of signal transduction in both the normal functioning of neural cells and those pathological changes that are manifested in neurological disorders. Current areas of emphasis include: G-protein-coupled receptor signaling and regulation, growth factor receptor signaling, apoptosis, cellular migration, and mechanisms of neuronal injury and repair.

Faculty:

S. Senogles (head)	*Molecular Sciences*	D. Johnson	*Ophthalmology*
S. Bahouth	*Pharmacology*	M. LeDoux	*Neurology*
E. Chaum	*Ophthalmology*	K. Malik	*Pharmacology*
R. Foehring	*Anat. & Neurobiology*	S. Tavalin	*Pharmacology*
M. Jablonski	*Ophthalmology*	R. Waters	*Anat. & Neurobiology*
J. Jaggar	*Physiology*	T. Yoo	*Medicine*

Translational Neuroscience

The NI promotes three **Translational Neuroscience** focus groups.

Focus 1: Neurodegenerative Diseases (Leader, Mark LeDoux, M.D., Ph.D., Neurology, UTHSC)

Human thought and behavior are a function of nervous system activity. Neurodegenerative diseases attack both, often simultaneously, and in the worst cases lead to years of debilitation and death, with the aged especially vulnerable. The substantial burden on the family as well as the health care system is obvious. Dissection of specific human neurological diseases in order to identify therapeutic targets and implement disease-modifying therapies requires expert clinical neurologists and neuroscientists with skill sets that cover the gamut from neurophysiology and neuropharmacology, to molecular neurobiology and neurogenetics. The NI contains several strong areas of disease-specific research, where basic scientists and clinical investigators interact to investigate the mechanisms of relatively common sensory-motor disorders like Parkinson's disease. Concomitantly, clinical neuroscience research related to many of the movement disorders is robust. Thus, the framework is in place at UTHSC for a vigorous program of translational Neuroscience research in the area of neurodegenerative diseases.

Neurodegenerative disease impacts a significant percentage of the U.S. population, and in many disorders the occurrence increases with age. For example, Parkinson's disease currently affects ~1.5 million people in the U.S., but 1 in 100 people over the age of 65 are afflicted, with the average age of onset being 60 years (National Parkinson's Foundation; CDC). Although the national prevalence of Alzheimer's disease is ~1.5% (afflicting some 4 million people), the frequency increases to 3% for men and women between ages 65-74, and it is estimated that 50% of those reaching 85 may have the disease (CDC; NIMH)! Multiple sclerosis currently afflicts some 400,000 U.S. citizens, but Tennessee has a rate higher than the national average. Neuropathy (a.k.a., neuritis), a peripheral nervous system inflammation producing pain, loss of sensation, and/or loss of muscular control, may be the most common single nervous system disorder, as it also accompanies many diseases of non-neuronal primary origin. Most notably, neuropathy accompanies 80% of the cases of type II diabetes, a disease found in some 8 million Americans and in a disproportionately high percentage of Tennesseans. Most recently, investigators studying traumatic brain injury (TBI) have linked TBI symptoms and pathology to a variety of neurodegenerative diseases, especially Alzheimer's and Parkinson's disease. The NI has added a new faculty with NI seed money support in Catherine Kaczorowski, who studies memory in aging and in Alzheimer's Disease. This coming spring (2014), NI plans to support a symposium on post-traumatic stress syndrome, which in some cases has been related to TBI.

Translational Research Areas:

The primary efforts of NI faculty have been in the areas of Parkinson's disease, Alzheimer's disease, Huntington's disease, TBI, and multiple sclerosis. Presently there are clinical trials covering Parkinson's, Huntington's disease, dystonia, restless legs syndrome, neuropathy and multiple sclerosis in the Dept. of Neurology at UTHSC. In support of this clinical research, many basic scientists in the NI are studying the related brain areas, including neuroanatomists, neurophysiologists and neurogeneticists. Translational research initially will focus on the genetic basis of disease and its susceptibility to treatment. Disease-associated DNA polymorphisms and their gene products will represent a strategic target for the group.

Focus 2: Brain, Mind and Behavior (Leader, Jeff Steketee, Ph.D., Pharmacology, UTHSC.)

The central nervous system is the target of the drugs that are abused by individuals at all ages. It is the reinforcing properties of these drugs that initially lead to abuse. Subsequently, long-term changes in brain chemistry and morphology take place, resulting in drug craving and severe disruption of normal behavior and social functioning. A translational approach to drug abuse research will foster interactions between basic and clinical investigators that engender a more powerful understanding of the impact of drugs of abuse on brain and behavior. Routine cooperation and collaboration between basic and clinical scientists will also result in the identification risk factors for abuse within subpopulations of Tennesseans, along with novel therapies that target high risk groups.

Memphis is no exception to the national trend in drug abuse and its co-morbid disorders (e.g., depression). Compared to 5 of its 8 neighboring states, Tennessee has higher rates of illicit drug use by its entire population (National Household Survey on Drug Abuse, 1999 and 2000). The association between depression and drug abuse is shown based on national figures. The high level of drug abuse amongst Tennesseans 12 years of age or older involves a large number of individuals: 286,000 persons per month used various illicit drugs (e.g., cocaine, marijuana), of which 48,000 were teens between 12 and 17 years of age. In addition, one million three hundred thirteen thousand (1,313,000) Tennesseans, age 12 or older, used tobacco – a known gateway to the use of illicit drugs. Of these, 78,000 teens used tobacco products. On a national scale, the interaction between illicit drug abuse and depression is demonstrated by the markedly increased prevalence of substance abuse among all individuals aged 12 or older who suffered a major depressive episode during 2004: 28.8% of those who suffered a major depressive episode used illicit drugs compared to 13.8% of those who did not experience a major depressive episode. Moreover, the prevalence of heavy alcohol use or cigarette smoking was higher in those who suffered a major depressive episode (alcoholism 9.2% vs. 6.9%; cigarette smoking 25.5% vs. 15.1%). In addition, we have approval from the College of Medicine to help hire 3 new neuroscientists, and one of the three top candidates is studying the genetics of schizophrenia, and another is studying the effects of ethanol on the neurons involved in Parkinson's disease.

Translational Research Areas:

- Drug abuse and co-morbid disorders

A major goal of this focus is the development of new definitions for clinical subtypes that depend on specific neurochemical, genetic and brain imaging patterns in patients, along with accurate behavioral profiling of antecedent history and response to intervention utilizing specific agents in clinical trials. These studies will entail reciprocal interactions between basic and clinical investigators, along with critical support from core facilities for genotyping (i.e. ID of single nucleotide polymorphisms, repeats, inversions, translocations, etc.) of probands and multigenerational families. fMRI imaging facilities will be critical in order to gain insight into brain dysfunction and its response to drug trials. Basic scientists will apply molecular, electrophysiological, neurochemical, behavioral and fMRI imaging technologies in animal models to understand fundamental aspects of the interaction between drugs of abuse and co-morbid disorders. Many of these interactions are based on known clinical observations, although novel clinical data, which further refine the hypotheses of basic neuroscientists, will undoubtedly derive from meticulous, high resolution, multi-parameter clinical studies. Our existing electrophysiological, neurochemical and behavioral equipment, facilities and faculty expertise in these areas are strengths of UTHSC. Existing genetic models along with novel knock-ins of homologous human mutations in mice will be powerful arrows in the quiver of basic scientists. This will require molecular expertise for the development of suitable genetic constructs and reliable, committed core expertise to generate, breed, validate and house recombinant mice. Adolescents are especially vulnerable to dependence on drugs of abuse, and this dependence is often a lifelong struggle. Therefore, initially, these studies will focus on adolescents in both human populations and animal models.

- Vulnerability to, and developmental effects of, drug abuse

Vulnerability to drug abuse is little understood, but certainly varies with age, as do the effects of drugs of abuse on brain function. Both vulnerability to abuse and drug effects may in turn reflect age-dependent alterations in neuronal connectivity and neuron function within the brain regions and circuits that subserve the associative learning and reinforcing properties of drugs and the response to environmental stressors and co-stimuli associated with drug seeking behavior. Thus, basic and clinical collaborations will identify biological markers of vulnerability to drug abuse in human populations and animal models of drug exposure initiated within the following time periods: gestation, adolescence, young adult, and geriatric. These studies will utilize the core fMRI imaging and genotyping technologies, along with the range of approaches mentioned in the foregoing paragraph.

Focus 3: Brain Development (Leader, Rob Williams, Ph.D., Anatomy & Neurobiology, UTHSC)

Understanding brain development is key to understanding adult cognition and behavior. Developmental dysfunctions can occur through inheritance, through pre- and perinatal trauma or toxicity, or even from the lack of meaningful social interaction during early life. Disorders with a strong clinical base (e.g., LeBonheur, Boling Center) include autism, learning disabilities, attention deficit disorders and epilepsy. Basic research ranges 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. We also anticipate considerable overlap with the Drug Abuse focus group as relates to brain development (see above). The group is highly collaborative and includes a significant contingent of neuroscientists from St. Jude Children's Research Hospital (primarily the Departments of Developmental Neurobiology and Genetics) and the University of Memphis. The genetics aspect in particular has received worldwide recognition in providing the Mouse Brain Library as well as other shared, web-based data sources. Last but not least, both clinicians and researchers in this area have strong ties to the Urban Child Institute to lead us out of the parochial realm of a medical school to be engaged and enriched by multidisciplinary approaches that focus on children aged 9 months to 3 years.

Translational Research Areas:

- Autism

Autism and associated autism spectrum disorders (ASDs) have received a major focus from funding agencies and represent an exciting window into understanding higher brain function. ASDs are brain development disorders characterized by abnormal social interactions, communication abilities, patterns of interests, and patterns of behavior. Whereas NIH lists frank autism prevalence at about 0.1%, according to the National Autism Association, 1 in 150 children have an ASD. To date, researchers have found several genes associated with ASDs. Fortunately for UT, the study of ASDs has a strong clinical component at the Boling Center and UT Pediatrics. There is a core of basic scientists within the NI interested in ASDs, covering behavioral, genetic and neuronal developmental aspects of animal models. We have the potential to develop strong collaborations with the Univ. of Memphis and Vanderbilt University.

- Pediatric Epilepsy

Epilepsy is a relatively common disorder affecting ~1% of the U.S. populace (Epilepsy Foundation; Center for Disease Control). More striking is that some 10% of the population will suffer a seizure during their lifetime. Characterized by uncontrolled brain seizure activity, epilepsy can have multiple origins (genetic, trauma) and a spectrum of seizure types. For children, the first year of life carries the highest risk, where seizures can be damaging and life threatening. Childhood epilepsy (~ ½ of the epilepsy cases nationwide) is more likely to be associated with genetic origins compared to adults, where stroke and accidents play greater roles. Epilepsy also targets minorities and those of lower socio-economic status with greater frequency. While in many cases seizures are well controlled with medication, a significant number of children are resistant to medical treatment, and other treatments carry significant side effects. "Designer drugs" for epilepsy provide increased hope of a better quality of life for many young patients with epilepsy. Neurologists and Neurosurgeons at Le Bonheur are investigating anti-seizure medications not yet on the market, and will be

using state of the art magnetoencephalography to assess drug actions on human brain activity. This work could benefit from translational interactions as basic researchers discover the mechanisms of actions of anti-epileptic drugs and help refine compounds to more precisely target seizure activity while avoiding debilitating side effects. Additional neurophysiological investigation of excised, epileptic tissue would help uncover the mechanisms underlying epileptic foci.

VII. 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 1) peer-reviewed journal publications during the last academic year as cited in PubMed, and 2) presentations at the 2012 meeting of the Society for Neuroscience in Washington, D.C., 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.**

VIII. GRADUATE AND POSTDOCTORAL TRAINING

The Graduate education at UTHSC has moved away from department-based graduate programs to a single Integrated Biomedical Sciences Program (IBSP) for students in the health sciences. The students matriculate into this integrated program, but within the IBSP, each student chooses one of a number of tracks, of which Neuroscience is one. Students who enter the graduate program are eligible for predoctoral stipends and a waiver of tuition. NI funds matching level stipends for the third and fourth year for students in the Neuroscience Track. UTHSC has agreed to pay all IBS stipends prior to placement in labs, during which time they take coursework and do research rotations.

Students in the Neuroscience track take a sequence of several graduate core courses. In the first year, students enroll in Neuroscience Seminar, Neuroscience Student Symposium, Functional Neuroanatomy, and one of three courses offered in alternate years- students must take two of these three courses: Cellular Neuroscience, Behavioral Neuroscience or Developmental and Molecular Neurobiology. Students must also take a Statistics class, either at UTHSC or University of Memphis. A wide variety of additional courses are available to Neuroscience graduate students on the UTHSC campus, including courses in biochemistry, physiology, pharmacology, histology, and genetics.

In addition to their coursework, graduate students register for 3-4 laboratory rotations during the first year of graduate study in order to help them choose a research mentor. They typically then enter a laboratory during their second year and begin to acquire the specialized training they will need to complete their doctoral dissertations. The Ph.D. degree is granted through the College of Graduate Health Sciences. The degree

requires a minimum of six semesters of graduate work and normally requires from four-six years to complete.

During the past academic year, NI supported matching stipends for 7 students. In addition 6 postdoctoral fellows were supported with matching funds. One graduate student previously supported by the NI was awarded the Ph.D. this past year. NI has taken a more active role in the national recruitment efforts for the graduate program (see Goals below and **Appendix 4**).

IX. NEUROSCIENCE SEMINARS AND SYMPOSIA

During the 2012-2013 academic year, the NI sponsored the weekly Neuroscience Seminar Series, hosting 28 seminars. Of these, 23 neuroscientists from outside UTHSC and 5 within the NI presented their recent research findings to UT faculty and students. 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. 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 Student Seminar course (course director William Armstrong), where students give seminars and receive critical feedback from their colleagues. A complete list of FY 2012-2013 seminar speakers and their topics is provided in **Appendix 3**.

NI continued its long-standing collaboration with the Urban Child Institute for a symposium on **"Train Your Brain: Early Eating Habits Affect Brain Development and Childhood Obesity".** This symposium had ~160 attendees (primarily those involved with care of infants to preK children) and received news coverage in the Commercial Appeal and the University Record (**Appendix 4**). Speakers were John Boughter, Ph.D. from UTHSC and the NI **("How Tricking the Brain's Taste System During Development May Lead to Obesity")** and Amanda Bruce, Ph.D. ("**Branding and a Child's Brain"**), from the Department of Psychology, University of Missouri-Kansas City. The NI also partnered with the Urban Child Institute, the CANDLE study group, and the Department of Preventive Medicine on a daylong conference that preceded these talks entitled ***"Pathways to Health and Well Being"***. This event featured 4 outside speakers and 5 local speakers, including NI member Dr. John Boughter. A flyer for this event is also shown in **Appendix 4**.

X. GOALS OF THE INSTITUTE AND RECENT ACCOMPLISHMENTS

Four long-range goals of the UT Neuroscience Institute were established in 1985 and set to promote

excellence in Neuroscience research, education and patient care at UTHSC. In the past 5 years we have made a concerted effort to promote Neuroscience at UTHSC, providing funds for numerous clinical and basic science research projects, funding postdocs in NI labs, and supporting the hiring of new Neuroscience faculty.

Goal 1. Augment our already strong research efforts in Neuroscience by a) recruitment of new faculty, b) renovation of facilities, c) acquisition of equipment, d) developing major programmatic activities, and e) creating a focal point to promote the exchange of information among our research faculty.

1a. Faculty recruitment. We successfully helped recruit two new members of Anatomy and Neurobiology, one of whom joined UTHSC Aug. 1 and the other of whom will join Oct. 1. NI provided $364,000 in seed money toward these recruits, Dr. Catherine Kaczorowski from the Medical College of Wisconsin, and Dr. Victor Chizhikov from the Seattle Children's Research Institute. However we are now partnering with the College and Medicine, Anatomy and Neurobiology and the Center for Integrative and Translational Genomics to recruit a Neurogenetisist to augment ongoing research programs. Applications are currently in review. NI will provide $150,000 to this recruit.

1b. Renovations. NI has designated space in the Neuroscience Imaging Center (3rd floor Link Building) and an Administrative Suite (426 Wittenborg building) containing a conference room, 4 offices and a common room. ***In spring of 2013 we also established the Neuroscience Histology Core to add to our Imaging and Behavioral Cores for faculty research support.***

1c. Acquisition of equipment/Imaging Center. 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 Director (Dr. Amanda Preston) provided by the NI. The web site for the Imaging Center is constantly refreshed: (http://www.uthsc.edu/neuroscience/imaging-center/index.php?doc=m_content.inc) and features on line scheduling. We are in the process of upgrading our Neurolucida reconstruction computer with a new Z-axis motor. We also purchased a fast frame video camera for behavioral analysis in the Behavioral Core.

1d. Developing major programmatic activities. Several areas of research focus exist within the NI and are consolidated into seven research groups. These areas include: 1) Neurological and Neurodegenerative Disorders, 2) Vision and Retina, 3) Neurogenetics, Development and Evolution, 4) Sensory Information Processing, 5) Excitable Properties of Neurons, 6) Mental and Addictive Disorders and 7) Neural Cell

Signaling. These areas of focus provide for interaction among faculty in different departments and promote collaborative research activities, focused journal clubs, and other programmatic interactions conducive to interdisciplinary neuroscience research and training. The details of this organization are provided above.

NI has made a concerted effort to participate in faculty hires the past year and coming year, and this will take a substantial amount of funds to contribute to seed packages. In addition, several of our supported faculty the past few years have used NI funds to acquire DOD or NIH funding, including Eldon Geisert, Monica Jablonski, and Jena Steinle.

1e. Creating a focal point to promote the exchange of information among our research faculty. There are several avenues for the exchange of information:

1) Over 200 posters describing the interdisciplinary Graduate and Postdoctoral Program in Neuroscience are distributed yearly to undergraduate institutions around the country (**see Appendix 4**).

2) The NI Neuroscience Seminar 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 past year, there were 25 seminars: 16 by visiting neuroscientists and 9 by UTNI faculty. Announcements are mailed to all participating faculty and students and are posted at various points throughout the UTHSC campus and a list of speakers is shown in **Appendix 3**.

3) There are several web servers maintained by NI or by NI faculty. The main NI site provides information on the NI and is a recruitment tool to attract first-rate neuroscience students and faculty. This site, at http://www.uthsc.edu/neuroscience/ now includes all of the services offered by the Neuroscience Imaging Core, the Behavioral Core, a list of NI supported research projects, recent external funding of NI members, the Neuroscience Undergraduate Merit Scholars, Neuroscience Track students, and many other items. Other servers are run by NI member and Governor's Chair, Rob Williams and offer Neuroscience faculty worldwide an avenue to present their research findings and search neurogenetic data, and is used daily by more than 100 scientists throughout the world. The servers may be found at: http://www.nervenet.org, http://www.genenetwork.org/, http://www.mbl.org/, http://www.complextrait.org/, and include the GeneNetwork, Mouse Brain Library, Complex Trait Analysis, Virtual Microscopy, Web QTL Project, among others.

4) Ms. Fleming maintains 2 servers for NI members. One server is for file exchange for users of the Imaging Center. All images are now digitally acquired from our confocal and electron microscopes and can be uploaded to this site by users, stored for a month, and downloaded at their convenience during that period. We also maintain a server for archiving all of our NI business.

5) NI maintains online scheduling calendars for the NI Imaging Center, Behavioral Core, and two conference rooms. In the case of the Imaging Center, these calendars also provide billing information to the administrative staff (PI, account numbers, hours used).

Goal 2. Promote education and research training in Neuroscience at the predoctoral (including undergraduate and graduate students, dental, medical and other professional students and minority students) and postdoctoral (including Ph.D.s, interns and residents) levels of students at UT and other Tennessee institutions.

2a. Training for underprivileged students continues to be active and supported by NI neuroscientists and their laboratories through funds from the state of Tennessee, the college of Pharmacy, and Rust College. NI involvement comes primarily under the **Prescience Program** (part of a Summer Research Scholars Program administered by UTHSC graduate college), which provides financial support for summer research internships, and is administered by NI member Prof. Emeritus E. J. Johnson (Dr. Johnson still works part-time for UTHSC) with the help of NI member Kristen O'Connell. The **Prescience Program** provides basic science career exposure (research laboratory apprentice-preceptorship) and basic science skills reinforcement activity for scholarly oriented high school and college minority students. Students are paired with an undergraduate apprentice with a Ph.D. or M.D. biomedical scientist preceptor in a one-to-one relationship. This association and environment are designed to inform the student of the undergraduate prerequisites and essential course work that are required to pursue doctoral studies and to inform them of the demands and relevance of communication skills, mathematics, and science to the conduct of biomedical research.

2b. This year marks our eighth year for awarding ***Undergraduate Neuroscience Merit Scholarships*** to outstanding undergraduates at Rhodes College, Christian Brothers University (CBU) and students at other undergraduate institutions with Neuroscience programs who return home to Memphis in the summertime. The Rhodes and CBU scholars work on independent projects for their undergraduate thesis. The scholars (and mentors) for 2013 were Stephanie Allen of CBU (Dr. Kanwaljeet Anand), Morgan Cantor of Rhodes College (Dr. Kathryn McVicar), Kevin Pham of CBU (Dr. Kristen O'Connell) and Gy Won Choi of Rhodes College (Dr. Tony Reiner). The mentors are in Anatomy and Neurobiology, Pediatrics, and Physiology. In some years, we also use this program to place Memphians who attend college elsewhere but wish to do summer research.

2c. In 2012 -2013, NI supported the stipends of 7 students. ***We continue to support the recruitment of graduate students into the Neuroscience Track of Interdisciplinary Program for Biomedical Sciences by creating and circulating a flyer to 200 different undergraduate biology, psychology, and neuroscience programs nationwide.*** A copy of the flyer can be found in **Appendix 4.** We recently pledged matching funds for another 6 Neuroscience Track students for FY 2013-2014. NI provides a conference room for many activities, including student classes. Students engage our outside speakers each week, both in scientific meetings as part of the Seminar Class, but socially as well. Students are included in faculty lunches with outside speakers, as are postdocs. Students are also encouraged to pick one of the outside speakers each year.

2d. In 2012-2013, NI supported matching funds for 9 postdoctoral students, and have committed to 8 postdocs for FY 2013-2014.

Goal 3: Hasten the application of the latest and most promising scientific information to the clinical treatment of neurological disorders (*e.g.*, Parkinson's disease, Alzheimer's disease, stroke, spinal cord injury, neurotrauma, brain tumors, cognitive disorders, drug addiction, and multiple sclerosis) by integrating educational and research programs.

3a. The Neuroscience Seminar series and Symposia encourage participation by the faculty, especially basic scientists and clinical faculty, to help foster collaborative research activities. Several of the research focus areas of the NI are devoted primarily to study of the basic biology of human disease, including the groups for Neurological and Neurodegenerative Disorders, Neuro-oncology, Vision and Retina, and Mental and Addictive Disorders. This aim was addressed by our Neuroscience seminar series (**Appendix 3**) and the Urban Child annual symposia (**Appendices 3, 4**), which are detailed above.

3b. Research Projects funded by NI. During 2012-2013, the NI did not award new research proposals but instead committed support two new faculty hires. However, NI did supplement the traumatic brain injury (TBI) research group ($2,000) and Pediatric's autism research ($2,550).

-**Clinical Research.** Included is the continued funding of Kathryn McVicar, Assistant Professor of Pediatrics, to finish protein screening of autistic children. This project was approved for a full proposal to Autism Speaks.

-**Neurotrauma Research**. NI still supports TBI research and extended a small amount of funds to the TBI head, Tony Reiner. This pilot work funded by NI uses an air cannon designed in the Department of Ophthalmology in order to deliver precise concussive head blows, mimicking explosion induced concussions. This project led to grant submissions to NIH and DOD.

-**Postdoctoral Research Awards.** The NI approved matching funds on a competitive basis for 8 postdoctoral fellows or research associates for FY 2012-2013. These awards are $15,000-$20,000 each. We will fund 8 postdocs in FY 2013-2014 at approximately the same level.

Goal 4: Interact with the faculty of other UT campuses and neighboring undergraduate institutions

Some NI faculty are involved in large multi-institutional grant programs, involving a number of universities (listed above). There is considerable collaboration between NI faculty on the UTHSC campus and investigators at St. Jude Children's Research Hospital and at the University of Memphis.

In addition to research collaborations, we continue to sponsor the Neuroscience Seminar Series on the UTHSC campus, which is often attended by faculty and students from other Memphis institutions, and our faculty are involved in workshops and seminars at other institutions and at national meetings. Our Translational Neuroscience Symposia, such as the "**Brain Trauma Symposium: Sports Concussions: The Hidden Risks"** symposium in April of 2011, bring together clinical and basic research scientists from our various local sites and outside of UTHSC. Currently we are planning a symposium for spring of 2014 on the Neuroscience of Post Traumatic Stress Disorder.

As mentioned previously, the NI continues its community interaction with Urban Child Institute with a community forum during Brain Awareness Week at the Urban Child Institute. This program, entitled "Train Your Brain: Early Eating Habits Affect Brain Development and Childhood Obesity" was directed toward parents, teachers, and other professionals involved in the care and early instruction of children (**Appendix 4**). The program was organized by NI member Paul Herron, Ph.D. and was hosted by NI Director William E. Armstrong. Two talks were featured, one by John Boughter, Ph.D. from UTHSC and the NI ("How Tricking the Brain's Taste System During Development May Lead to Obesity") and the other by Amanda Bruce, Ph.D. ("**Branding and a Child's Brain"**), from the Department of Psychology, University of Missouri-Kansas City. Also as indicated above, the NI partnered with the Urban Child Institute, the CANDLE study group, and the Department of Preventive Medicine on a daylong conference that preceded these talks entitled "*Pathways to Health and Well Being".* **(Appendix 4).**

APPENDIX 1

External Funding of Neuroscience Institute Faculty

FY 2012-2013

PI	AWARD TITLE	SPONSOR	Sponsor Award no	AWARD BEGIN DATE	AWARD END DATE	FY 2013 Total Cost
Armstrong, William	Reproductive Plasticity in Oxytocin Neurons	NIH-NICHHD	1R01HD072056-01A1	1/15/2013	12/31/2013	$311,250.00
Bhattacharya, Syamal	Proprietary Study	Private	BYS-MD-70	7/20/2012	7/19/2013	$110,747.00
Bhattacharya, Syamal	Proprietary Study	Private	BYS-MD-70	7/20/2012	7/19/2013	$9,000.00
Boughter, John	Sensory Coding in Taste	NIH-NIDCD	5 R01 DC000353-28	9/1/2012	8/31/2013	$273,992.00
Chaum, Edward	Delta State Rural Development Network Grant Program: TEAM Sugar-Free	Delta Health Alliance	2D60RH08555-05-00	8/1/2012	7/31/2013	$44,716.00
Chaum, Edward	Proprietary Study	Private	Project 3192	7/20/2012	7/19/2013	$3,200.00
Chaum, Edward	Treatment of Vision Loss in a New Mouse Model of Blast Injury.	Vanderbilt University Medical Center	VUMC40775 W81XWH-10-1-0528	8/1/2012	8/29/2013	$19,534.00
Dopico, Alejandro	Vasodilation via selective pharmacological targeting of BK channel beta1subunits	NIH - NIHBL	1 R01 HL104631-03	12/1/2012	11/30/2013	$333,521.00
Dopico, Alejandro	Vasodilation via selective pharmacological targeting of BK channel beta1subunits	NIH - NIHBL	1 R01 HL104631-03 REVISED	12/1/2012	11/30/2013	$19,271.00
Dopico, Alejandro	Ethanol Actions on SLO Channels From Arteries VS Brain	NIH - NIAAA	5 R37AA11560-15	7/1/2012	6/30/2013	$340,193.00
Dragatsis, Ioannis	Loss of Huntingtin in the Adult Mouse - Transcriptome Analyses	CHDI, Inc.	A-5423	7/1/2012	6/30/2013	$186,205.00
Fletcher, Max	Cholinergic Modulation of Early Olfactory Sensory Olfactory	Pew Charitable Trusts		7/1/2012	6/30/2013	$60,000.00
Foehring, Robert	Slowly Inactivating K+ Channels in Neoxortical Pyramidal Cells	NIH - NINDS	2R01NS044163-09	7/1/2012	6/30/2013	$367,249.00
Geisert, Eldon	Modulators of Retinal Injury	NIH-NEI	2R01 EY017841-05A1	5/1/2013	4/30/2014	$375,000.00
Geisert, Eldon	Novel Therapy and Mechanisms in Glaucoma	Vanderbilt University Medical Center	VUMC 40726 5R01EY022349-03	4/1/2013	3/31/2014	$57,633.00
Geisert, Eldon	Novel Therapy and Mechanisms in Glaucoma	Vanderbilt University Medical Center	VUMC40726 7R01EY022349-02	2/15/2013	2/14/2014	$34,655.00
Geisert, Eldon	Genetic Networks Activated by Blast Injury to the Eye	DOD	W81XWH-12-1-0255	7/15/2012	7/14/2013	$1,000,000.00
Heck, Detlef	Cerebellar Modulation of Frontal Cortical Function	University of Memphis (UM)	5R01NS063009-04	3/1/2011	2/28/2014	$81,351.00
Heck, Detlef	Manipulation and imaging of synchronous population activity in the neocortex	NIH - NINDS	5R21NS077281-02	8/1/2012	7/31/2013	$149,500.00
Heck, Detlef	CRCNS: Cerebellar Cortico-Nuclear Interactions	Emory University	S310099 5R01NS067201-04	9/1/2012	8/31/2013	$118,289.00
Iannaccone, Alessandro	Autoimmunity and Age-Related Macular Degeneration	NIH-NEI	1R01EY022706-01	9/1/2012	8/31/2013	$375,000.00

Jablonski, Monica	Genetic Modulation of Glaucoma	NIH-NEI	5 R01 EY021200-03	6/1/2013	5/31/2014	$356,250.00
Jablonski, Monica	Oculotherapy	LaunchYourCity Inc.	LYC	9/15/2012	9/14/2013	$20,000.00
Jablonski, Monica	Improved formulations for topical delivery of brimonidine for glaucoma	University of Tennessee Research Foundation	UTRF	12/10/2012	12/9/2013	$15,000.00
Jaggar, Jonathan	Calcium channels in arterial smooth muscle cells	NIH - NIHBL	5 R01 HL094378-04	3/1/2013	2/28/2014	$329,670.00
Jaggar, Jonathan	Calcium channels in arterial smooth muscle cells	NIH - NIHBL	5 R01 HL094378-04 REVISED	3/1/2013	2/28/2014	$19,048.00
Jaggar, Jonathan	Arterial Smooth Muscle Chloride Channels	NIH - NIHBL	5 R01 HL110347-02	7/1/2012	6/30/2013	$420,343.00
Kita, Hitoshi	Rhythmicity and Synchrony in the Basal Ganglia	Northwestern University	0600 370 S554 / 60021273 UT P50NS047085	10/5/2012	10/4/2013	$210,149.00
Ledoux, Mark	Coenzyme Q10 in Huntington's Disease	Massachusetts General Hospital	2CARE 2U01NS052592-06	9/30/2012	7/31/2013	$201,400.00
Ledoux, Mark	The Role of THAP1 in Dystonia	NIH - NINDS	5 R01 NS069936-03	8/1/2012	7/31/2013	$317,275.00
Ledoux, Mark	Proprietary Study	Private	Dystonia Coalition	5/24/2011	8/31/2014	$75,000.00
Ledoux, Mark	Genetics of Dystonia-Spastic Paraplegia	Cincinnati Children's Hospital Medical Center		5/17/2013	5/16/2014	$10,000.00
Leffler, Charles	Control of Neonatal Circulation	NIH - NIHBL	2R01HL034059-28A1	6/7/2013	5/31/2014	$389,706.00
Leffler, Charles	Hydrogen Sulfide in Newborn Cerebral Circulation	NIH - NIHBL	5 R01 HL042851-22	8/1/2012	7/31/2013	$377,289.00
Li, Wei	Discovery of tissue-selective, nonhypercalcemic VDR modulators for RA treatment	NIH - NIAMSD	1R21AR063242-01A1	4/1/2013	3/31/2014	$159,375.00
Liao, Francesca-Fang	Novel regulation of BACE1 by nitrosative and metabolic stresses	Alzheimer's Association	11RG-11-204030	9/1/2012	8/31/2013	$66,600.00
Liao, Francesca-Fang	AD pathogenesis in a novel diet model with partial eNOS deficiency	NIH-NIA	1R21AG041934-01A1	9/30/2012	8/31/2013	$225,000.00
Malik, Kafait	Ecosanoids-Induced Vascular Growth During Injury	DHHS - NIH - National Heart, Lung, and Blood	1 R01 HL079109-07	12/1/2012	11/30/2013	$347,625.00
Malik, Kafait	Ecosanoids-Induced Vascular Growth During Injury	NIH - NIHBL	1 R01 HL079109-07 REVISED	12/1/2012	11/30/2013	$20,085.00
Malik, Kafait	Angiotensins, Prostaglandins - - Adrenergic Interactions	NIH - NIHBL	5 R01 HL19134-38	4/1/2013	3/31/2014	$581,462.00
Malik, Kafait	Angiotensins, Prostaglandins - - Adrenergic Interactions	NIH - NIHBL	5 R01 HL19134-38 REVISED	4/1/2013	3/31/2014	$10,821.00
McDonald, Michael	GD3 synthase gene therapy to improve memory and prevent neurodegeneration	NIH-NIA	5 R01AG0402301-02	9/1/2012	8/31/2013	$307,500.00
McDonald, Michael	GD3S knockdown to improve cognitive and motor deficits in models of parkinsonism	NIH - NINDS	5R01NS065063-05	2/1/2013	1/31/2014	$285,548.00

McDonald, Michael	GD3S knockdown to improve cognitive and motor deficits in models of parkinsonism	NIH - NINDS	5R01NS065063-05 REVISED	2/1/2013	1/31/2014	$20,623.00
McDonald, Michael	Dietary glycomacropeptide (GMP) for neuroprotection and cognitive enhancement	NIH-NIA	5R21AG041935-02	4/15/2013	2/28/2014	$168,750.00
McDonald, Michael	Dietary glycomacropeptide (GMP) for neuroprotection and cognitive enhancement	DHHS - NIH - National Institute on Aging	5R21AG041935-02 REVISED	4/15/2013	2/28/2014	$8,438.00
Miller, Duane	Treatment with KZ-41 and OTP Promotes wound healing in a radiation combined injury model	NIH- NIAID	5 R33 AI080534-05	9/1/2012	8/31/2013	$356,484.00
Miller, Duane	Proprietary Study	Private		1/31/2013	1/30/2014	$47,359.00
Nowak, Thaddeus	Eliminating anesthesia confounds in experimental stroke	NIH - NINDS	1 R21 NS077039-02	9/1/2012	8/31/2013	$187,500.00
Nowak, Thaddeus	Genetics of stroke vulnerability in mice	NIH - NINDS	5R21NS066166-02	7/1/2012	6/30/2013	$187,500.00
Nowak, Thaddeus	Genetics of stroke vulnerability in mice	NIH - NINDS	5R21NS066166-02S1	7/1/2012	6/30/2013	$22,460.00
O'Connell, Kristen	Leptin signaling in hypothalamic neurons and glutamate receptors	Beth Israel Deaconess Medical Center	01025884 5R01DK09040-02	5/1/2013	4/30/2014	$25,285.00
O'Connell, Kristen	Leptin signaling in hypothalamic neurons and glutamate receptors	Beth Israel Deaconess Medical Center	1R01DK094040	5/19/2012	4/30/2013	$25,285.00
Parfenova, Elena	Cerebrovascular Stress and Circulating Endothelial Cells	NIH - NINDS	5 R01 NS063936-04	2/1/2013	1/31/2014	$285,548.00
Parfenova, Elena	Cerebrovascular Stress and Circulating Endothelial Cells	NIH - NINDS	5 R01 NS063936-04 REVISED	2/1/2013	1/31/2014	$20,623.00
Parfenova, Elena	Heme Oxygenase and Cerebral Vascular Injury	NIH - NINDS	5 R01HL099655-09	6/1/2013	5/31/2014	$348,718.00
Pfeiffer, Ronald	Proprietary Study	Private	SP1055 Study	5/16/2013	12/31/2013	($24,060.00)
Pfeiffer, Ronald	Vasodilation via selective pharmacological targeting of BK channel beta1subunits	TEVA Neuroscience	TEVA	5/3/2013	5/4/2013	$10,000.00
Reiner, Anton	Neural Control of Choroidal Blood Flow	NIH-NEI	5 R01 EY005298-26	4/1/2013	3/31/2014	$337,500.00
Reiner, Anton	Neural Control of Choroidal Blood Flow	NIH-NEI	5 R01 EY005298-26 REVISED	4/1/2013	3/31/2014	$18,750.00
Steinle, Jena	Compound 49b prevents diabeticretinopathy through IGFBP3	Juvenile Diabetes Foundation	1-2011-597	8/1/2012	7/31/2013	$165,000.00
Steinle, Jena	Compound 49b Prevents Retinal Endothelial Cell Death Through IGFBP-3 Levels	NIH-NEI	1R01EY022045-01A1	9/1/2012	8/31/2013	$375,000.00
Steinle, Jena	Mechanisms of TNFalpha-Induced Insulin Resistance in Retinal Cells	NIH-NEI	1R01EY022330-01A1	6/1/2013	5/31/2014	$262,500.00
Steinle, Jena	Study of blast injury	DOD	W81XWH-12-1-0318	8/15/2012	2/13/2013	$250,000.00

Tavalin, Steven	Proprietary Study	Private	VUMC38103 2R01MH063232-13	1/1/2013	12/31/2014	$18,637.00
Zhou, Fuming	TRPC3 channel mediates 5-HT2C receptor-induced excitation	NIH - NINDS	5 R03 NS076960-02	9/1/2012	8/31/2013	$75,000.00
Zhou, Fuming	Regulation of basal ganglia output neurons	NIH - NINDS	5R01NS058850-05	9/1/2012	8/31/2013	$269,231.00
TOTAL						$12,477,583.00

APPENDIX 2

Faculty Publications and Society for Neuroscience Presentations

FY 2012-2013

1) Peer-reviewed publications for 2012-2013 (cited in PubMed):

Adebiyi, A, Thomas-Gatewood, CM, Leo, MD, Kidd, MW, Neeb, ZP, & **Jaggar, JH.** (2012). An elevation in physical coupling of type 1 inositol 1,4,5-trisphosphate (IP3) receptors to transient receptor potential 3 (TRPC3) channels constricts mesenteric arteries in genetic hypertension. [In Vitro Research Support, N.I.H., Extramural]. *Hypertension, 60*(5), 1213-1219.

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Anand, KJ, Palmer, FB, & **Papanicolaou, AC**. (2013). Repetitive neonatal pain and neurocognitive abilities in ex-preterm children. [Editorial]. *Pain, 154*(10), 1899-1901.

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Ariga, T, Itokazu, Y, **McDonald, MP**, Hirabayashi, Y, Ando, S, & Yu, RK. (2013). Brain gangliosides of a transgenic mouse model of Alzheimer's disease with deficiency in GD3-synthase: expression of elevated levels of a cholinergic-specific ganglioside, GT1aalpha. [Research Support, N.I.H., Extramural Research Support, U.S. Gov't, Non-P.H.S.]. *ASN Neuro, 5*(2), 141-148.

Bannister, JP, Bulley, S, Narayanan, D, Thomas-Gatewood, C, Luzny, P, Pachuau, J, & **Jaggar, JH**. (2012). Transcriptional upregulation of alpha2delta-1 elevates arterial smooth muscle cell voltage-dependent Ca2+ channel surface expression and cerebrovascular constriction in genetic hypertension. [Research Support, N.I.H., Extramural]. *Hypertension, 60*(4), 1006-1015.

Bannister, JP, Leo, MD, Narayanan, D, Jangsangthong, W, Nair, A, Evanson, KW, Pachuau, J, Gabrick, KS, **Boop, FA**, & **Jaggar, JH**. (2013). The voltage-dependent L-type Ca2+ (CaV1.2) channel C-terminus fragment is a bi-modal vasodilator. [Research Support, N.I.H., Extramural]. *J Physiol, 591*(Pt 12), 2987-2998.

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by ionotropic glutamate receptor-mediated endothelial oxidative stress and apoptosis. [Research Support, N.I.H., Extramural]. *Am J Physiol Cell Physiol, 304*(11), C1105-1115.

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Brager, AJ, Stowie, AC, **Prosser, RA**, & Glass, JD. (2013). The mPer2 clock gene modulates cocaine actions in the mouse circadian system. [Comparative Study]. *Behav Brain Res, 243*, 255-260.

Branham, K, Othman, M, Brumm, M, Karoukis, AJ, Atmaca-Sonmez, P, Yashar, BM, Schwartz, SB, Stover, NB, Trzupek, K, Wheaton, D, Jennings, B, Ciccarelli, ML, Jayasundera, KT, Lewis, RA, Birch, D, Bennett, J, Sieving, PA, Andreasson, S, Duncan, JL, Fishman, GA, **Iannaccone, A**, Weleber, RG, Jacobson, SG, Heckenlively, JR, & Swaroop, A. (2012). Mutations in RPGR and RP2 account for 15% of males with simplex retinal degenerative disease. [Research Support, N.I.H., Extramural Research Support, Non-U.S. Gov't]. *Invest Ophthalmol Vis Sci, 53*(13), 8232-8237.

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Chowdhury, D, Marco, S, Brooks, IM, Zandueta, A, Rao, Y, Haucke, V, Wesseling, JF, **Tavalin, SJ**, & Perez-Otano, I. (2013). Tyrosine phosphorylation regulates the endocytosis and surface expression of GluN3A-containing NMDA receptors. [Research Support, N.I.H., Extramural Research Support, Non-U.S. Gov't]. *J Neurosci, 33*(9), 4151-4164.

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2) Abstracts presented at 2012 Annual Society for Neuroscience Meeting, New Orleans, LA

Gregg, L and **McDonald, MP** (2012) An examination of the low dose MPTP model to induce executive dysfunction in mice. *Neuroscience Abstract*.

Cooper, J and **Prosser**, **RA** (2012) Inhibiting lipoprotein receptor-related protein 1 with receptor associated protein prevents glutamate-induced phase delays of the SCN circadian clock. *Neuroscience Abstract*.

Dong, C and **Anand**, **K** (2012) Ketamine dose-dependently modulates the expression of NMDA receptors in rat fetal cortical neural stem progenitor cells. *Neuroscience Abstract*.

Prosser, **RA**, Blakely, RD, Nackenoff, AG, and Glass, JD (2012) *In vitro* cocaine fails to phase-shift the mammalian circadian clock of knock-in mice expressing a serotonin transporter lacking high-affinity cocaine recognition *Neuroscience Abstract*.

Yamada, Y and **Prosser**, **RA** (2012) Copper regulates phase shifting of the SCN circadian clock In vitro by modulating NMDA receptor activation in a circadian manner *Neuroscience Abstract*.

Stowie, AC, Amicarelli, MJ, **Prosser**, **RA**, and Glass, JD (2012) Effects of chronic oral cocaine self-administration and withdrawal on circadian regulation. *Neuroscience Abstract*.

Roy, **S**,Ito, J, Cao, Y, Gruen, S, and **Heck**, **DH** (2012) Delta/theta band LFP oscillations and gamma band power in mouse barrel cortex are coupled to respiratory rhythm. *Neuroscience Abstract*.

Lindsay, JH, Glass, JD, and **Prosser**, **RA** (2012) Dose dependency and duration of rapid tolerance to ethanol in the mammalian circadian clock. *Neuroscience Abstract*.

Ogden, KK, Traynelis, SF, and **Heldt**, **SA** (2012) Potentiation of GluN2C/D-containing NMDA receptors enhances emotional learning. *Neuroscience Abstract*.

Kim, J and **Kita**, **H** (2012) High frequency- and burst-stimulation induced short- and long-term synaptic plasticity of striato-pallidal synapses. *Neuroscience Abstract*.

Deng, Y, Wong, T, Bricker-Anthony, C, Deng, B, and **Reiner**, **A** (2012) Patterns of loss of corticostriatal and thalamostriatal terminals from direct and indirect pathway projection neurons and cholinergic interneurons in q140 Huntington's disease knock-in mice. *Neuroscience Abstract*.

Griffin, ST, Aboud, O, Mrak, RE, and **Boop**, **F** (2012) APOE genotype influences cellular and molecular responses in epilepsy. *Neuroscience Abstract*.

Pavesi, E, Heldt, SA, and **Fletcher**, **ML** (2012) Neuronal nitric oxide deficiency impairs olfactory fear conditioning. *Neuroscience Abstract*.

Miyoshi, G, Karayannis, T, Roberta, A, McKenzie, M, Lavado, A, Iwano, T, Taniguchi, H, Nakajima, M, Matsuzaki, F, Huang, JZ, Heintz, N, and **Oliver**, **G** (2012) Prox1 regulates both the migration and maturation of caudal ganglionic eminence-derived cortical interneurons. *Neuroscience Abstract* .

Kwak, YD, Wang, B, Li, J, Wang, R, Deng, Q, Diao, S, Chen, Y, Xu, R, Masliah, E, Xu, H, Sung, JJ, and **Liao**, **FF** (2012) Upregulation of the E3 ligase NEDD4-1 by oxidative stress degrades IGF-1 receptor protein in neurodegeneration. *Neuroscience Abstract*.

Foehring, RC, Horton, LR, and Guan, D (2012) On-cell recordings of potassium channels in neocortical pyramidal neurons from layer 5. *Neuroscience Abstract*.

Sheth, BR, Coskun, MA, Loveland, KA, Pearson, DA, and **Papanicolaou, AC** (2012) The cortex of individuals with autism adapts to tactile stimulation. *Neuroscience Abstract*.

Wang, J, Adeosun, S, Hou, X, Zheng, B, Stockmeier, C , Paul, I, Ou, X, Bigler, S, **Smeyne, R**, Brinton, R, Melrose, H, and Lewin, J (2012) Development of allopregnanolone as a therapeutic for Parkinson’s disease in neurotoxin symptomatic and idiopathic mouse models. *Neuroscience Abstract*.

Gao, Y and **Heldt, SA** (2012) The role of neuronal nitric oxide in the acquisition and performance of two-way active avoidance in mice. *Neuroscience Abstract*.

Yu, G, **Chen, H**, and **Sharp, B** (2012) Repeated stress enhanced the reacquisition of nicotine self-administration after withdrawal in nicotine-dependent rats. *Neuroscience Abstract*.

Bukiya, A, Liu, J, Singh, A, and **Dopico, A** (2012) Calcium-sensing regulatory of conductance for potassium (RCK) domains are critical to embold slo1 and related channel proteins with high sensitivity to ethanol. *Neuroscience Abstract*.

Gong, S, Yu, G, and **Sharp, B** (2012) Nicotine self-administration modulates local glutamate and GABA transmission in prelimbic cortex in response to stress. *Neuroscience Abstract*.

Blundon, JA, Bayazitov, I, Chassen, R, and **Zakharenko, SS** (2012) Plasticity of mature thalamocortical synapses is gated by adenosine dependent inhibition of glutamate release and released by muscarinic receptor activation. *Neuroscience Abstract*.

McDonald, MP, Rao, SK, Mobley, JA, Bernardo, A, and Harrison, FE (2012) Voluntary exercise induces proteomic changes associated with spatial memory improvement in wild-type, but not APP/PSEN1 transgenics. *Neuroscience Abstract*.

Douglas, JN, Gardner, L, Lee, S, Shin, Y, Groover, CJ, Mainali, S, and **Levin, MC** (2012) The RNA binding protein hnRNP A1 contributes to mechanisms of neurodegeneration in immune mediated neurological disease. *Neuroscience Abstract*.

Matta, SG, **Chen, H**, Hiler, K, Tolley, EA, and **Sharp, BM** (2012) Genetic factors control nicotine self-administration in isogenic adolescent rat strains. *Neuroscience Abstract*.

Dubose, CS, Mulligan, MK, **Williams, RW**, **Lu, L**, and **Hamre, KM** (2012) MicroRNAs (miRs) and addiction: Phenotypic response to drugs of abuse and alcohol is correlated with the expression of key genes involved in miR biogenesis using a genetically diverse population. *Neuroscience Abstract*.

Selandipalayam, SM, Cao, Y, **Heck, D**, and Jaeger, D (2012) The rate and regularity of Purkinje cell spiking affects the signal transfer of behavior locked rate modulation in the cerebellar cortico-nuclear pathway. *Neuroscience Abstract*.

Decosta-Fortune, T, Morshed, B, **Li, CX**, Ramshur, JT, Vemulapalli, S, Curry, A, and **Waters, RS** (2012) Interactive neuronal embedded system for the controlled delivery of telemetry-based stimulation and real-time response recordings. *Neuroscience Abstract*.

Cao, Y, Maran, S, Jaeger, D, and **Heck, D** (2012) Representation of behaviors in the cerebellum: Spike rate modulation vs spike timing. *Neuroscience Abstract*.

Lester, DB, Pani, AK, Blaha, CD, and **Smeyne, R J** (2012) Alterations in stimulation-evoked dopamine release in mice carrying a R1441G mutation in the LRRK2 gene. *Neuroscience Abstract*.

Sharp, BM, Luo, R, Gong, S, Taylor, WL, Geschwind, DH, **Chen, H**, and **Matta, SG** (2012) Mesolimbic gene networks associated with voluntary nicotine intake in adolescent inbred rats. *Neuroscience Abstract*.

Wright, BT, Gluszek, CF, and **Heldt, SA** (2012) Behavioral tolerance to zolpidem and associated changes in forebrain GABAA receptor subunits. *Neuroscience Abstract*.

Reiner, AJ, **Elberger, AJ**, Deng, Y, Guley, NM, Islam, RM, Cai, C, Del Mar, N, **Honig, MG**, and Rex, T (2012) A novel closed-head model of primary overpressure blast produces mild traumatic brain injury in mice. *Neuroscience Abstract*.

Wang, L and **Armstrong, WE** (2012) Up-regulation of phosphorylated extracellular signal regulated kinase ½ in rat oxytocin neurons during late pregnancy. *Neuroscience Abstract*.

McKimm, E, Corkill, B, Rodgers, T, **Heck, D**, Goldowitz, D, **Mittleman, G**, and Blaha, C (2012) Cerebellar Purkinje cell loss results in a reduction in glutamatergic strength within two distinct cerebellar-prefrontal cortex pathways involved in modulating cortical dopamine release: Relevance to the Autism disconnection hypothesis. *Neuroscience Abstract*.

Sakata, S, Jha, S, Mastin, JR, and Dong, BE (2012) Effects of antidepressant treatment on mice lacking BDNF expression through promoter IV. *Neuroscience Abstract*.

Laughlin, RE, Grant, TL, **Williams, RW**, Lusis, AJ, and Jentsch, JD (2012) The genetics of reversal learning: Extended findings in the hybrid mouse diversity panel. *Neuroscience Abstract*.

Dickson, PE, Corkill, B, Rogers, TD, McKimm, E J, Miller, MM, Clardy, EL, Goldowitz, D, Blaha, CD, and **Mittleman, G** (2012) Effects of stimulus salience on serial reversal learning performance of a mouse model of fragile X syndrome . *Neuroscience Abstract*.

Earls, LR, Fricke, RG, Yu, J, Baldwin, LT, and **Zakharenko, SS** (2012) Age-dependent microRNA control of ER Ca2+ stores and synaptic plasticity in 22q11 deletion syndrome and schizophrenia. *Neuroscience Abstract*.

Liu, Y, Blaha, CD, **Mittleman, G**, Goldowitz, D, and **Heck, DH** (2012) Cerebellar modulation of neuronal activity in mouse prefrontal cortex. *Neuroscience Abstract*.

Summers, KC and **Steketee, JD** (2012) Effects of repeated cocaine exposure on SAPA3 levels in addiction related brain regions. *Neuroscience Abstract*.

Chen, H and Wu, Q (2012) Nicotine self-administration with an aversive olfactogustatory cue in a permissive social environment in adolescent rats. *Neuroscience Abstract*.

Walters, BJ and **Zuo, J** (2012) An inducible rtTA mouse line for lineage tracing and gene manipulation in glial and supporting cells within the auditory and balance sense organs of the inner ear. *Neuroscience Abstract*.

Lee, S, Shin, Y, Mainali, S, and **Levin, MC** (2012) Molecular characterization of neuronal hnrnp a1 proteins: Cell-specific expression and neurodegeneration. *Neuroscience Abstract*.

Nai, Q, **Dong, H**, Linster, C, and **Ennis, M** (2012) Noradrenergic regulation of spontaneous and evoked GABA-mediated inhibition mitral cells in main olfactory bulb. *Neuroscience Abstract*.

Bendahmane, M and **Fletcher, ML** (2012) Cholinergic modulation of the sensitivity of olfactory mitral/tufted cells responses in the glomerular layer. *Neuroscience Abstract*.

Akano, EO, **McDonald, MP**, and Rex, TS (2012) RAAV-mediated shrna knock-down of gd3 synthase (gd3s) reverses “executive” deficits in parkin null mice. *Neuroscience Abstract*.

Lattimer, S, **Elberger, AJ**, **Lu, L**, and **Hamre, KM** (2012) Strain and sex dependent effects on the severity of ethanol-induced brain damage. *Neuroscience Abstract*.

Waters, RS, **Li, CX**, and Vemulapalli, S (2012) The cuneate nucleus (CN) may not play a major role in delayed large-scale cortical reorganization in rat forepaw barrel subfield (FBS) cortex. *Neuroscience Abstract*.

Lavado, AJ, and **Oliver, G** (2012) Jagged1 is necessary for neural stem cell maintenance during postnatal and adult neurogenesis in the dentate gyrus. *Neuroscience Abstract*.

Zhang, T, Striz, M, Goldowitz, D, Donohue, KD, Chesler, EJ , **Hamre, KM**, and O'Hara, BF (2012) Improved phenotyping and QTL analysis of sleep and wake traits in mice using a non-invasive, high-throughput piezo system. *Neuroscience Abstract*.

APPENDIX 3

Neuroscience Seminar Speakers

FY 2012-2013

NEUROSCIENCE SEMINAR SERIES

SCHEDULE

Fall 2012

William E. Armstrong, Ph.D. — September 11, 2012
Director
Neuroscience Institute
Professor
Anatomy and Neurobiology
UTHSC

Title: "The Hypothalamo-Neurohypophysial System: Structure, Function and Plasticity"

Uwe Rudolph, M.D. — September 18, 2012
Host: Scott Heldt, Ph.D.
Director
Laboratory of Genetic Neuropharmacology
McLean Hospital
Associate Professor
Department of Psychiatry
Harvard Medical School

Title: " Beyond Classical Benzodiazepines: Novel Therapeutic Potential of $GABA_A$ Receptor Subtypes"

Richard J. Smeyne, Ph.D. — September 25, 2012
Host: Anton Reiner, Ph.D.
Associate Member
Department of Developmental Neurobiology
St. Jude Children's Research Hospital

Title: "Influenza, Inflammation, and Idiopathic Parkinson's Disease"

Susan Slaugenhaupt, Ph.D. — October 2, 2012
Host: Ioannis Dragatsis, Ph.D.
Associate Professor

Department of Neurology (Genetics)
Harvard Medical School
Center for Human Genetic Research
Massachusetts General Hospital

Title: "Modification of mRNA Splicing to Treat the Neurologic Disease Familial Dysautonomia (Riley-Day Syndrome)"

Michael Kilgard, Ph.D. October 9, 2012
Host: Stanislav S. Zakharenko, M.D., Ph.D.
Professor
Department of Neuroscience
University of Texas at Dallas

Title: "Directing Neural Plasticity to Understand and Treat Neurological Disease"

Anastasios V. Tzingounis, Ph.D. October 23, 2012
Host: Robert Foehring, Ph.D.
Assistant Professor
Department of Physiology and Neurobiology
University of Connecticut

Title: "Mapping SK channels in Living Neurons using Single Molecule AFM"

Andrew Papanicolaou, Ph.D. October 30, 2012
Host: William Armstrong, Ph.D.
Professor and Chief
Department of Pediatrics
Division of Clinical Neurosciences
University of Tennessee and Neuroscience Institute
LeBonheur Hospital

Title: "Magnetocephalography: A Non-invasive Alternative to the Wada Procedure"

John D. Boughter, Jr., Ph.D. November 6, 2012
Associate Professor
Department of Anatomy & Neurobiology
UTHSC

Title: "Functional Organization of the Parabrachial Nucleus in Mice: Understanding how the Sense of Taste Engages Disparate Forebrain Areas"

Anton Reiner, Ph.D. November 13, 2012
Professor
Department of Anatomy & Neurobiology
UTHSC

Title: "Differential Cortical Control of Go and No-Go Circuits of the Basal Ganglia"

Patricia M. Di Lorenzo, Ph.D. November 27, 2012
Host: John D. Boughter Jr., Ph.D.
Professor
Department of Psychology
Director
Integrative Neuroscience Major
Binghamton University

Title: "It Takes a Village: Neural Coding of Taste in the Brainstem"

Takashi Kodama, Ph.D. December 4, 2012
Host: Detlef Heck, Ph.D.
Postdoctoral Fellow
Systems Neurobiology Laboratories
Salk Institute of Biological Sciences

Title: "Molecular Dissection of the Cerebellar Learning"

David Van Essen, Ph.D. December 11, 2012
Host: Robert W. Williams, Ph.D.
Professor and Department Head
Department of Anatomy and Neurobiology
Washington University in St. Louis

Title: "The Human Connectome Project"

NEUROSCIENCE SEMINAR SERIES
SCHEDULE

SPRING 2013

Shane T. Hentges, Ph.D. January 15, 2013
Host: Kristen O'Connell, Ph.D.
Assistant Professor
Department of Biomedical Science
Colorado State University

Title: "The Many Transmitters of Hypothalamic Neurons: Implications for Energy Balance and Reward"

Max Fletcher, Ph.D. January 29, 2013
Assistant Professor
Department of Anatomy and Neurobiology
UTHSC

Title: "Cholinergic Modulation of Olfactory Bulb Glomerular Odor Responses"

Hongjun Song, Ph.D. February 19, 2013
Host: Bo Wang
Professor of Neurology and Neuroscience
Director, Stem Cell Program at Johns Hopkins Institute for Cell Engineering

Title: "Neuronal Activity-Induced Changes in the Epigenetic Landscape of DNA Methylation in the Adult Brain"

Richard Mooney, Ph.D. March 5, 2013
Host: Anton Reiner, Ph.D.
George Barth Geller Professor of Neurobiology
Duke University School of Medicine

Title: "Song Learning: From Synapse to Behavior"

John Nickerson, Ph.D. March 12, 2013
Host: Eldon Geisert, Ph.D.
Professor
Department of Ophthalmology
Emory University

Title: "Ocular Growth, Emmetropia, and Interphotoreceptor Retinoid-Binding Protein (IRBP)"

Thomas Wichmann, M.D. March 26, 2013
Host: Fu-Ming Zhou, Ph.D.
Professor
Department of Neurology
Emory University

Title: "Extrastriatal Functions of Dopamine in the Basal Ganglia"

Fu-Ming Zhou, Ph.D. April 2, 2013
Associate Professor
Department of Pharmacology
UTHSC
Title: "Dopamine, Ion Channels, Basal Ganglia
and Parkinson's Disease"

Hao Chen, Ph.D. April 9, 2013
Assistant Professor
Department of Pharmacology
UTHSC

Title: "Nicotine Reward - Social & Genetic Factors"

Tobias Riede, Ph.D. April 16, 2013
Host: Mark LeDoux, M.D., Ph.D.
Research Assistant Professor
Department of Biology
University of Utah

Title: "Integrative Vocal Physiology: Interplay Between Neural Control
and Physical Properties"

Christopher Cowan, Ph.D. April 23, 2013
Host: Larry Reiter, Ph.D.
Associate Professor
Department of Psychiatry
Harvard Medical School
Director, Integrative Neurobiology Laboratory
McLean Hospital

Title: "Molecular Mechanisms of Synapse Elimination: Implications for Drug Addiction, Fragile X Syndrome and Autism"

Harvey Swadlow, Ph.D. April 30, 2013
Host: Robert Waters, Ph.D.
Professor
Department of Psychology
University of Connecticut

Title: "Brain State and the Awake Visual Thalamocortical Network"

Gregg Homanics, Ph.D. May 7, 2013
Host: Scott Heldt, Ph.D.
Professor
Departments of Anesthesiology and Pharmacology & Chemical Biology
University of Pittsburgh

Title: "Genetics and Epigenetic Mechanisms of Ethanol Action"

Megan Mulligan, Ph.D. May 14, 2013
Research Associate
Department of Anatomy and Neurobiology
UTHSC

Title: "Genetic Determinants of CNS Variation: Mapping Brain Gene Expression, Neuronal Subtypes, & Behavior across Murine Populations"

APPENDIX 4

Neuroscience News, Events and Graduate Training Flyer

FY 2012-2013

The 3rd Annual

CANDLE Brain Awareness Week Conference

Pathways to Health and Well-Being

Thursday, March 21, 2013

The Urban Child Institute: 600 Jefferson Avenue, Memphis TN 38105

9:00am **The CANDLE Study: Community, Family and Individual Characteristics as Risks for SE Problems**
Frances Tylavsky, Dr.P.H., Professor, Department of Preventive Medicine, UTHSC, PI CANDLE Study

9:30am **Correlates of Socioemotional and Neurocognitive Outcomes: Racial Disparities**
Frederick Palmer, MD, Shainberg Professor of Developmental Pediatrics, UTHSC

10:00am **The Influence of Genetic and Epigenetic Patterns on Child Behaviors**
Alicia K. Smith, Ph.D., Assistant Professor of Psychiatry and Behavioral Sciences, Emory University, Graduate Division of Biological and Biomedical Sciences

10:30am **Break**

10:45am **Genetics of Maternal Psychological Symptoms and Impact on Neonatal Gene Expression**
Khyobeni Mozhui, Ph.D., Research Associate, Department of Anatomy and Neurobiology, UTHSC

11:15am **Epigenetics – Memories of Past Exposures and Predictors of Diseases**
Wilfried J. J. Karmaus, MD, Dr. Med., MPH, Professor and Director, Division of Epidemiology, Biostatistics, and Environmental Health, School of Public Health, University of Memphis

12:00pm **Lunch** (provided)

12:45pm **How Tricking the Brain's Taste System During Development May Lead to Obesity**
John D. Boughter, Ph.D., Associate Professor, Department of Anatomy and Neurobiology, UTHSC

1:15pm **Predicting Accelerated Weight Gain in Urban Infants and Toddlers**
Kristoffer S. Berlin, Ph.D., Assistant Professor, Clinical, Department of Psychology, University of Memphis

1:45pm **Children's Brain Responses to Food: Obesity Implications for the Developing Child**
Amanda S. Bruce, Ph.D., Assistant Professor, Department of Psychology, University of Missouri-Kansas City

2:30pm **Associations Between Physical Activity, Body Composition and Resting Brain Activity – Preliminary Findings**
Eszter Volgyi, Ph.D., Assistant Professor, Department of Preventive Medicine, UTHSC

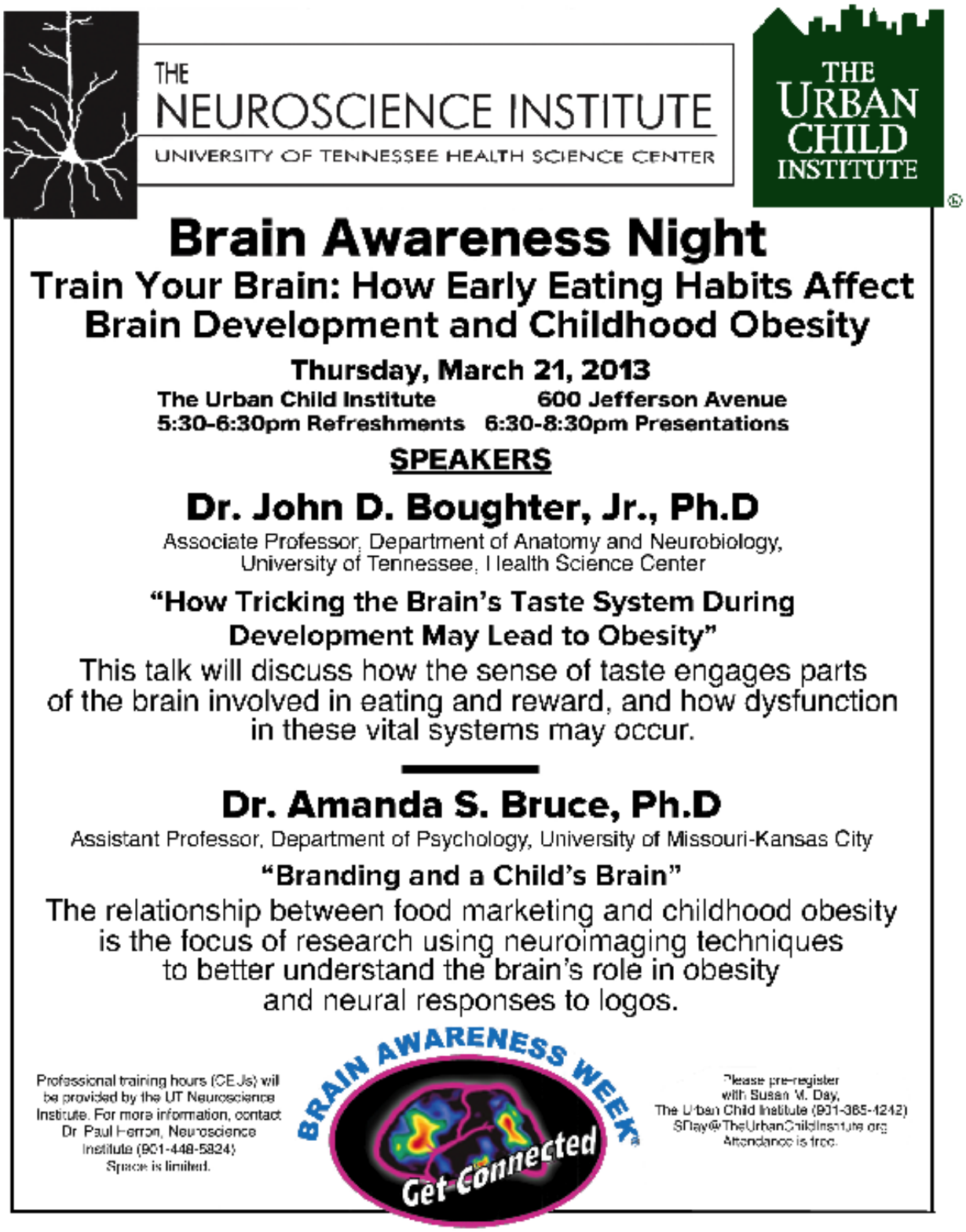
3:00pm **Discussion/ Summary**
Moderated by Kaja LeWinn, DSc, Assistant Adjunct Professor, Department of Psychiatry, University of California- San Francisco

BRAIN AWARENESS WEEK
Get Connected
THE DANA ALLIANCE FOR BRAIN INITIATIVES

the CANDLE study
http://www.candlestudy.org

THE NEUROSCIENCE INSTITUTE
UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER
http://www.uthsc.edu/

THE URBAN CHILD INSTITUTE
http://www.theurbanchildinstitute.org


THE
NEUROSCIENCE INSTITUTE
UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER
THE URBAN CHILD INSTITUTE
Brain Awareness Night
Train Your Brain: How Early Eating Habits Affect Brain Development and Childhood Obesity
Thursday, March 21, 2013
The Urban Child Institute 600 Jefferson Avenue
5:30-6:30pm Refreshments 6:30-8:30pm Presentations
SPEAKERS
Dr. John D. Boughter, Jr., Ph.D
Associate Professor, Department of Anatomy and Neurobiology, University of Tennessee, Health Science Center
"How Tricking the Brain's Taste System During Development May Lead to Obesity"
This talk will discuss how the sense of taste engages parts of the brain involved in eating and reward, and how dysfunction in these vital systems may occur.
Dr. Amanda S. Bruce, Ph.D
Assistant Professor, Department of Psychology, University of Missouri-Kansas City
"Branding and a Child's Brain"
The relationship between food marketing and childhood obesity is the focus of research using neuroimaging techniques to better understand the brain's role in obesity and neural responses to logos.
Professional training hours (CEUs) will be provided by the UT Neuroscience Institute. For more information, contact Dr. Paul Herron, Neuroscience Institute (901-448-5824) Space is limited.
BRAIN AWARENESS WEEK
Get Connected
Please pre-register with Susan M. Day, The Urban Child Institute (901-365-1242) SDay@TheUrbanChildInstitute.org Attendance is free.

THE COMMERCIAL APPEAL
Memphis, Tennessee
Printer-friendly story
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Coffee Break: Fogelman Management wins 3 new contracts

The Commercial Appeal

Saturday, September 15, 2012

A Memphis-based apartment management company has extended its national reach by adding 723 units in Texas, Colorado and North Carolina.

Fogelman Management Group has been awarded new contracts to manage the 192 apartments of One Normal Square in Charlotte, N.C., the 168 units at Eagle Ridge in Loveland, Colo., and the 372 apartments of St. Laurent Apartments in Dallas.

The company now manages more than 19,000 apartments valued at more than $1.5 billion and located in 13 states and 25 cities.

"We are excited to continue to gain market share in these strategic growth markets for FMG, as we now operate more than 2,200 units in Texas, 1,500 units in North Carolina and 750 units in Colorado," president Mark Fogelman said in a prepared statement.

Glosson in 2014

Greg Glosson of Fast Track Realty has been selected as the 2013 president-elect of the Memphis Areas Association of Realtors.

The Realtors' board of directors picked Glosson, who has served on the board in 2011-2012 and is this year's secretary-treasurer.

"Greg has been an excellent representative as a MAAR director and he will provide outstanding leadership as our 2014 president," MAAR executive vice president Melanie Blakeney said.

Regina Hubbard of ERA Legacy Realty will be as MAAR president in 2013, with John Linthicum of Crye-Leike the vice president and Thomas Murphree of Hackmeyer Realty the secretary-treasurer.

Research grant

A University of Tennessee Health Science Center researcher will use a new $1 million Army grant to study how genes affect the severity of blast injuries in soldiers' eyes.

Eldon Geisert, a professor in the university's departments of ophthalmology and

anatomy and neurobiology, will use the funds to develop new research strategies that could turn into better treatments.

The grant is from the U.S. Army Medical Research Acquisition Activity.

Farm report

Memphis-area banks expect higher income and capital spending from area farms this year over last year, the only zone in the Federal Reserve Bank's Eight District to report such optimism.

The district's cotton and corn crop is the source of the sunny outlook in the Memphis area, the Federal Reserve reported, but the rest of the survey "suggests that the severe drought has had a noticeable impact on current and expected farm incomes and expenses."

Demand for farm loans was "healthy" in the year's second quarter and was stronger in the Memphis and Louisville zones. And weaker demand in the St. Louis zone. However, survey respondents said they expected lower rates of repayment in the Louisville and Memphis zones.

NEWS » THE FLY-BY March 28, 2013

Q & A with Dr. John D. Boughter Jr.,

Brain Expert from University of Tennessee Health Science Center

by LOUIS GOGGANS

Memphis is the most obese city in the nation, according to a recent Gallup Well-Being Index. And for some overweight Memphians, it's a problem that begins in early childhood.

click to enlarge

Dr. John D. Boughter, Jr.

On March 21st, the Urban Child Institute held its eighth annual Brain Awareness Night focused on the brain and childhood obesity and development. A public forum titled "Train Your Brain: How Early Eating Habits Affect Brain Development and Childhood Obesity" featured two presenters and drew more than 100 attendees.

One of the speakers was Dr. John D. Boughter Jr., an associate professor in the University of Tennessee Health Science Center's Department of Anatomy and Neurobiology. Boughter delivered a slideshow presentation that centered on how one's sense of taste engages parts of the brain involved in eating and reward and how dysfunction in these vital systems may occur.

Boughter talked to the *Flyer* about the brain's reward system and what can be done to curb childhood obesity.

Flyer: Can you explain the basis behind your presentation?
Boughter: I [talked] about the taste system in general, how it's organized, and how certain foods activate your sense of taste and how that leads to activation of specific parts of your brain that have to do with reward and drug addiction and eating.

During your presentation, you touched on the many foods that have some form of sweetness. How does sweet taste activate the brain's reward system?

Sweet taste is rewarding. It represents a good food source for humans. The funny thing about that is that sweet taste is relatively rare in nature. What foods truly taste sweet in nature? You're talking about ripe fruits, honey, but, beyond that, you can't think of too many. These are things that activate reward systems in the brain. The way we're setup is to seek these things out.

How does taste dysfunction occur within the brain's reward system?
We're talking about early childhood development, so the idea is that children actually have an affinity for sweet-tasting things. If you give a baby two types of baby food, they'll always pick the one that's sweet-tasting. When we over-encourage this kind of behavior during development, we lead to long-lasting dietary habits that are not good for us. So that's what we talk about when we mention taste dysfunction.

What can we do about the growing childhood obesity problem here?
Something has to be done, because it's a billion-dollar health problem in this country right now. It's associated with diabetes, hypertension, and all sorts of problems down the road. It's something that we definitely have to combat aggressively. Paying attention to diet is extremely important, as well as exercise. I think the main thrust of it is to establish healthy eating patterns from the get-go.

How can people train their taste systems to desire better foods?
People need to understand that a lot of the foods we eat have been designed by the food industry to overwhelm your taste system and activate it. You have to be on guard [and] think about the things you eat and taste, especially understanding the natural basis of your taste system and how it works. It's about making dietary changes.

The Fly-By archives »

Tags: The Fly-By

THE COMMERCIAL APPEAL
Memphis, Tennessee
Printer-friendly story
Read more at commercialappeal.com

Guest column: Are brain and taste 'branded' for food?

By Amanda S. Bruce and John D. Boughter, Special to The Commercial Appeal

Sunday, March 10, 2013

Most of us have heard that the prevalence of childhood obesity has increased dramatically. The rate has tripled in the past 30 years. The consequences of obesity are grim for children and adults, including health problems such as Type 2 diabetes, high blood pressure, heart disease and cancer. Obesity is also associated with psychosocial difficulties like bullying, discrimination, anxiety and depression. Experts say that because of the consequences of obesity, our current generation of children will be the first in many to live shorter lives than their parents. From an economic perspective, obesity is expensive, with a cost of $147 billion each year in the United States alone.

What causes obesity? At the most basic level, obesity results from a chronic imbalance such that energy intake is greater than energy expenditure. But the reasons for this seemingly simple equation, that calories consumed are greater than calories burned, are quite complicated. The reasons for a chronic energy imbalance range from brain activation differences to genetic predispositions, from the sense of taste to societal influences.

Food marketing is one factor believed to contribute to the increasing obesity epidemic. Each year, companies spend $10 billion advertising their products to children. And an overwhelming majority, 98 percent, of the food products advertised to children on television are high in fat, sugar or sodium.

Many factors affect eating habits, but one of the most important is taste. Individuals who have lost their sense of taste are no longer motivated to eat. On the other hand, researchers have shown that consumption of sweet-tasting foods can activate the same parts of the brain that are involved in drug addiction, leading to the idea that people may actually develop “food addictions.” Overconsumption of sugar and carbohydrate-rich foods during childhood may lead to lasting changes in these brain “reward” systems, and contribute to the development of lifelong poor dietary habits.

In recent years, researchers have used brain imaging to gain a better understanding of food motivation and how the brain is involved in eating behaviors and obesity. Studies

show that brain activation patterns in obese and healthy-weight individuals differ in response to food. We are only beginning to understand whether this is a cause or effect, however. Early evidence suggests that after healthy weight loss, a person's brain activation patterns change.

Children are bombarded with advertisements every day, yet little research has investigated how this affects children at the neural level. Using neuroimaging, we can study the effects of food logos on obese and healthy-weight children. A recent study showed children's brains "light up" in response to familiar logos. But healthy-weight children showed greater brain activation in regions of the brain associated with self-control, when shown food versus nonfood logos. In addition, the group of healthy-weight children said they had more self-control than the obese children.

These findings add to the body of research showing that in certain situations, healthy-weight individuals experience greater activation of control regions of the brain than obese individuals. It is possible obese children may be more vulnerable to the effects of food advertising. This raises questions about the ethics of advertising unhealthy foods to children, particularly children who are overweight or obese.

Amanda Bruce is a clinical psychologist and researcher at the University of Missouri-Kansas City. John Boughter is a neuroscientist at the University of Tennessee Health Science Center. They will speak at a public symposium on eating behaviors and the brain, called "Train Your Brain: How Early Eating Habits Affect Brain Development and Childhood Obesity," from 6:30 p.m. to 8:30 p.m. on March 21 at The Urban Child Institute, 600 Jefferson Ave. Bruce will discuss the relationship between food marketing, the brain and childhood obesity; Boughter will talk about taste and the brain.

This is one in a series of monthly guest columns on the importance of public/private investment in early childhood. For more information, call The Urban Child Institute at 901-385-4233 or visit tuci.org.