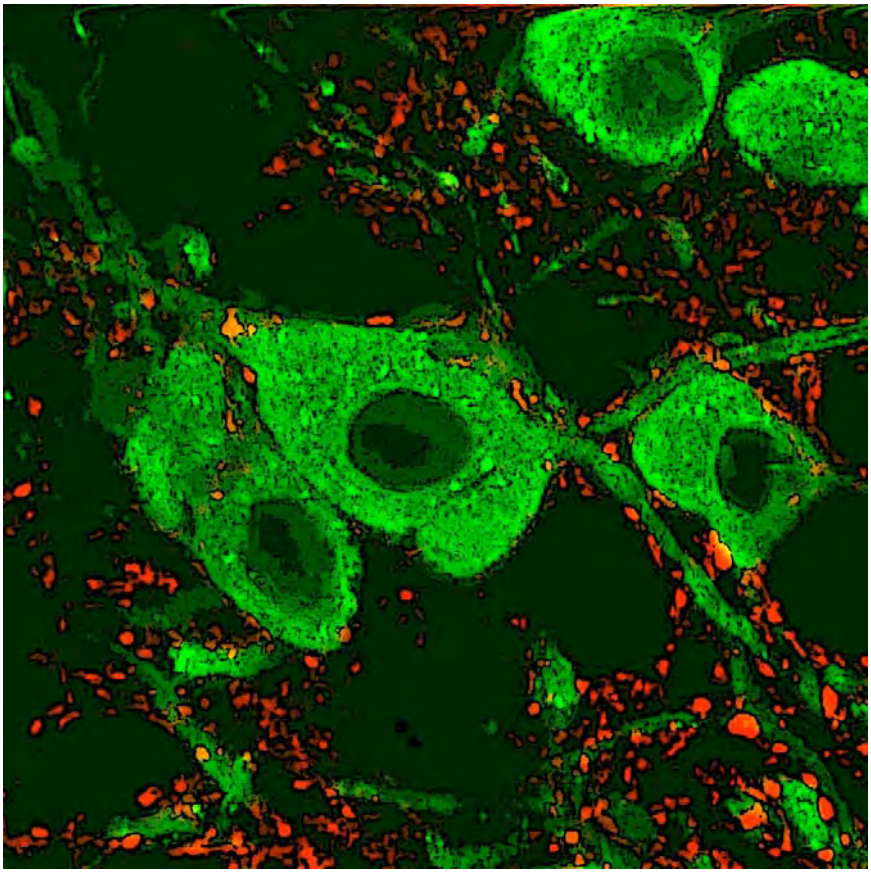
THE NEUROSCIENCE INSTITUTE

UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

Neuroscience Center of Excellence



Annual Report to the

Tennessee Higher Education Commission

Fiscal year 2009-2010

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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:	Michele Tungsvanich
IT Specialist/	
Business Manager:	Brandy Fleming

Neuroscience Executive Committee:

Matthew Ennis, Ph.D., Professor and Chair, Department of Anatmy 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

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

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

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

Burt Sharp, M.D., Van Vleet Professor and Chair, 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) 448-5956

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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 Dean of the College of Medicine at UTHSC, currently J. Lacey Smith, M.D (acting Dean). 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.

II. BUDGET (see Schedule 7, page 6)

A. 2009-10. The FY 2009-10 appropriated budget for the UTNI was $639,800. We carried forward $458,634 from the previous year for a total budget of $1,098,434. This carryover continues 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, amounts previously encumbered for research projects were not all used due to ongoing projects and faculty leaving UTHSC.

This past FY, we expended $540,211 in total personnel costs, including administrative supplements (w/fringe) for the NI Director (who also directs the NI Imaging Center), the NI Co-Director, the Director of Confocal Microscopy, a full-time IT specialist/Business Manager, a ¾ time Administrative Specialist, full time Technical Director of Imaging Center, part time histologist in the Imaging Center, matching support for 9 student stipends, and 7 matching postdoctoral fellowships. In addition, NI continues to partner with COM and the Department of Neurology by supporting Dr. Mike MacDonald, hired in 2007. NI will pay ~25% of Dr. MacDonald's salary/fringe over another year. Finally, it is important to note that this amount also includes personnel employed under the pilot projects NI funded this past year.

Neuroscience Imaging Center: In addition to paying the Technical Director of 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, and the Neurolucida workstation. This year our cost-recovery program took in $63,861, which paid for our new histologist and provided fees against the $44,590 in service contracts and maintenance. We purchased a workstation for analyzing confocal images (Imaris/Bitplane) (~$25,000). This software provides 3-dimensional deconvolution and volume extraction from serial confocal images, and will be used in conjunction with the Zeiss 710 Spectral Scanning confocal microscope we have ordered from a grant we successfully submitted to NIH/NCRR (Armstrong, PI). To ready the room for this microscope, we added a 220 V line and two independent 110V lines.

Seminars and Symposia: Additional funds went to support travel ($18,988) and honoraria ($3,600) for

Neuroscience Seminar series, the Brain Awareness Symposium in collaboration with the Urban Child Institute, and a Symposium in "Neuroprotection in Neurodegenerative Disease". **(see Appendix 4).**

Pilot Projects: NI spent $81,137 in Pilot Research projects in 2009-2010, and in support of the Neurotrauma Center at UTHSC. Clinical pilot projects received additional matching funds from the College of Medicine. These are detailed in **Goal 3** under Item **X** below.

B. <u>2010-2011</u>. We will carryover $430,222 to the coming fiscal year, and have been appropriated $660,143 for a total of $1,090,365. The majority of the carryover is committed to sustaining our Clinical and Basic Science Pilot Research projects, and a new initiative to fund Supplemental Research projects. Here is a breakdown of the major anticipated projects:

Students: For the coming year, we have awarded matching funds for 7 graduate stipends to PIs with graduate students on a competitive basis ($11,500 each). Mentors are located in the departments of Anatomy and Neurobiology, Ophthamology, Neurology and Pharmacology.

Postdoctoral Support: We have awarded 9 postdoctoral matching awards, at $15,000 each, for the coming year. The NI Mentors are located in the departments of Anatomy and Neurobiology, Neurology, Ophthamology, and Pharmacology.

Neuroscience Imaging Center: For FY 2011 we have made a new contract with a third party to provide service for the JEOL 2000, with substantial savings ($16,000 vs $28,000). We will install our new Zeiss 710 spectral scanning, confocal microscope the first week of Octorober, 2010. This grant was awarded from NIH and NCRR (National Center for Research Resources), for $468,446. The PI was NI Director Willam Armstrong, with 5 additional major users, and 7 minor users spanning departments of Anatomy and Neurobiology, Neurology, and Pharmacology, all members of UTNI. Since our Technical Director, Ms. Kathy Troughton is retiring in June of 2011, this year we will advertise and hire a new Technical Director for the Imaging Facility. This person will need to be on site for a few months overlap with Ms. Troughton in order to learn all facets of the work involved in the Imaging Center.

NI Faculty: In addition to the administrative supplements provided to Drs. Armstrong, Reiner, and Elberger, we will commit a fourth and final year of partial salary support to Dr. Mike McDonald ($108,089 over 4 years) in the Department of Neurology. Dr. McDonald is a behavioral Neuroscientist, specializing in genetic models of Alzheimer's disease. His presence is critical to the further development of translational neuroscience at UTHSC. Dr. McDonald is an Associate Professor and currently holds two R01s from NIH.

Pilot and other Research Projects: The NI will commit $287,500 to support clinical and basic science research projects aimed at developing research grant applications during the next FY. This amount reflects the $250,000 to support proposals and $37,500 to continue the last year of support for two Clinical Pilot Projects. The projects represent collaborative efforts among NI members across disciplines and departments. The details of these projects can be found under **Goal 3, item X below.**

Seminar Series and Community Outreach: We will continue to fund the 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. We will also continue to 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. In addition, some undergraduate Merit fellows will be Memphians attending universities outside of Memphis, but who return to Memphis during summer vacation.

Schedule 7

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

Institution UT Health Science Center **Center** Neuroscience

	FY 2009-2010 Actual			FY 2010-11 Proposed			FY 2011-12 Requested		
	Matching	Appropr.	Total	Matching	Appropr.	Total	Matching	Appropr.	Total
Expenditures			0			0			0
Salaries									
Faculty	500,050	70,479	**570,529**	495,011	70,000	**565,011**	500,050	65,000	**565,050**
Other Professional	32,691	130,591	**163,282**	40,912	178,000	**218,912**	32,691	130,600	**163,291**
Clerical/ Supporting	30,228	122,432	**152,660**	35,000	152,000	**187,000**	30,300	130,000	**160,300**
Assistantships	137,636	107,113	**244,749**	180,200	78,100	**258,300**	180,200	80,000	**260,200**
Total Salaries	**700,605**	**430,615**	**1,131,220**	**751,123**	**478,100**	**1,229,223**	**743,241**	**405,600**	**1,148,841**
Longevity	850	5,707	**6,557**	850	4,500	**5,350**	850	4,725	**5,575**
Fringe Benefits	189,197	103,890	**293,087**	95,000	95,000	**190,000**	95,000	85,000	**180,000**
Total Personnel	**890,652**	**540,211**	**1,430,863**	**846,973**	**577,600**	**1,424,573**	**839,091**	**495,325**	**1,334,416**
Non-Personnel									
Travel		**18,988**	**18,988**		25,000	**25,000**		26,250	**26,250**
Software		26,357	**26,357**			**0**		0	**0**
Books & Journals			**0**			**0**		0	**0**
Other Supplies		**41,564**	**41,564**		131,400	**131,400**		30,000	**30,000**
Equipment		**5,974**	**5,974**		216,365	**216,365**		6,615	**6,615**
Maintenance		**44,590**	**44,590**		40,000	**40,000**		40,000	**40,000**
Scholarships		**14,098**	**14,098**		16,000	**16,000**		20,000	**20,000**
Consultants		**5,976**	**5,976**		4,000	**4,000**		4,200	**4,200**
Renovation			**0**			**0**		0	**0**
Imaging Center Recovery		**(63,861)**	**(63,861)**		(35,000)	**(35,000)**		(36,750)	**(36,750)**
Pilot Encumbered		**34,314**	**34,314**		35,000	**35,000**			**0**
New Fac Appts			**0**		30,000	**30,000**		30,000	**30,000**
Startup			**0**		50,000	**50,000**		50,000	**50,000**
Total Non-Personnel	**0**	**128,001**	**128,001**	**0**	**512,765**	**512,765**	**0**	**170,315**	**170,315**
GRAND TOTAL	**890,652**	**668,212**	**1,558,864**	**846,973**	**1,090,365**	**1,937,338**	**839,091**	**665,640**	**1,504,731**
Revenue									
New State Appropriation		639,800	**639,800**		660,143	**660,143**		665,640	**665,640**
Carryover State Appropriation		458,634	**458,634**		430,222	**430,222**			**0**
New Matching Funds	890,652		**890,652**	846,973		**846,973**	839,091		**839,091**
Carryover from Previous Matching Funds			**0**			**0**			**0**
Total Revenue	**890,652**	**1,098,434**	**1,989,086**	**846,973**	**1,090,365**	**1,937,338**	**839,091**	**665,640**	**1,504,731**

III. EXTRAMURAL FUNDING OF NEUROSCIENCE FACULTY

The UT Neuroscience Institute remains one of the largest concentrated Neuroscience programs in the country and has achieved an international reputation as a preeminent center for Neuroscience in the United States. For FY09, the core department, Anatomy and Neurobiology, was ranked ***16th in the nation among public medical schools and 27th overall*** (of 82). Another participating NI department that is highly ranked by funding is Physiology (7 funded NI members), which was ranked ***4th in the nation*** in 2009 by the Association of Chairs in Physiology (41 departments), and ***19th overall*** (of 93).

The total annual grant dollars (direct costs) currently held by faculty associated with the UTNI at UTHSC (*i.e.,* excluding affiliates) is **$19,353,152**. ***Given an investment by the State of Tennessee of ~$15 million over the past 25 years, Neuroscience faculty have generated approximately $301.3 million in external grant funds (direct costs only, largely from NIH). The additional indirect costs add significantly to that amount.***

The research grants (annual direct costs) currently held by individual faculty of the UTNI are listed by Principal Investigator in **Appendix 1**.

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 and a weekly seminar series, and to support community outreach programs such as those associated with Brain Awareness Week. The Director from 1985-2002 was Dr. Steven T. Kitai. 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 over ninety 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 are present with Methodist University Hospital, Le Bonheur Children's Hospital, St. Jude's Children Hospital, the University of Memphis, Rhodes College and Christian Brother's University. The interdepartmental nature of the program and the collaborations it fosters provide the cross-disciplinary environment necessary for high quality neuroscience research, training and patient care.

In June of 2002, Dr. David V. Smith, Chairman of the Department of Anatomy and Neurobiology, followed

Dr. Kitai as Director of UTNI. Dr. Smith formed the Executive Committee, with Dr. William Armstrong continuing as Co-Director and Director of the Neuroscience Imaging Center. In Dec. of 2005, Dr. Smith became ill with a brain tumor, and Dr. William Armstrong became acting Director. Dr. Armstrong was named permanent Director of NI in 2006.

In spring of 2006 the NI Executive Committee expanded to include two additional clinical neuroscientists, professors Mark LeDoux (Neurology) and Jim Wheless (Pediatrics), and one new basic scientist, professor Charles Leffler (Physiology). Dr. Tony Reiner, a professor in A & N, was named NI Co-Director in 2007, shortly after joining the Executive Committee. The latest member of the Executive Committee is Dr. Matthew Ennis, Chair of Anatomy and Neurobiology, who joined in 2008.

V. FACULTY OF THE NEUROSCIENCE INSTITUTE

The Neuroscience Institute is currently comprised of over 90 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. Seven new faculty are shown in ***bold italics*** were recruited to the Institute in FY 2009-10. In addition, NI lost 4 clinical faculty members.

Department of Anatomy and Neurobiology

William E. Armstrong, Ph.D., Professor and Director
John D. Boughter, Jr., Ph.D. Associate Professor
Joseph C. Callaway, Ph.D., Associate Professor
Angela Cantrell, Ph.D., Assistant Professor
Elissa Chesler, Ph.D., Assistant Professor (Affiliate, Oak Ridge National Labs)
Alessandra d'Azzo, Ph.D., Affiliated Professor (St. Jude)
Hong Wei Dong, Ph.D., Assistant Professor
Michael A. Dyer, Ph.D., Affiliated Assistant Professor (St. Jude)
Andrea J. Elberger, Ph.D., Professor
Matthew Ennis, Ph.D., Professor
Malinda E. C. Fitzgerald, Ph.D., Adjunct Professor (Christian Brothers Univ.)
Max Fletecher, Ph.D., Assistant Professor
Robert C. Foehring, Ph.D., Professor
Kristin Hamre, Ph.D., Assistant 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

Hitoshi Kita, Ph.D., Professor

Cheng-Xiang Li, M.D., Assistant 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)

Melburn R. Park, Ph.D., Associate Professor

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., Assistant Professor

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

Robert S. Waters, Ph.D., Professor

Robert W. Williams, Ph.D., Dunavent Professor

Yi-Hong Zhang, Ph.D., Assistant Professor

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

Department of Biochemistry and Cellular and Molecular Biology, UT Knoxville

Rebecca A. Prosser, Ph.D., Associate 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., Associate Professor

Michael C. Levin, M.D., Associate 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 Chairman

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

Department of Neurosurgery

Frederick Boop, M.D., Associate Professor

Jon H. Robertson, M.D., Robertson Professor and Chairman

Department of Ophthalmology

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

Eldon E. Geisert, Ph.D., Professor

Allesandro Iannoccone, M.D., Assistant Professor

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

Tonia S. Rex, Ph.D., Assistant 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

Kanwakheet 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

Department of Pharmacy

Collin Hovinga, Pharm.D., Assistant Professor

Department of Pharmacology

Suleiman W. Bahouth, Ph.D., Associate Professor
Alex M. Dopico, M.D., Ph.D., Professor
Liao, Francesca-Fang, 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 and Chairman
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, Professor
Charles W. Leffler, Ph.D., Professor
Kristen M.S. O'Connell, Ph.D., Assistant Professor

Helena Parfevona, Ph.D., Professor
Mitchell A. Watsky, Ph.D., Professor

Department of Psychiatry

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

Department of Surgery

Syamal Bhattacharya, Ph.D., Professor

University of Memphis

Ramin Homayouni, Ph.D., Associate Professor
Guy Mittleman, Ph.D., Professor

St. Jude Children's Hospital

Michael Dyer, Ph.D., Associate Professor
Alessandra D'Azzo, Professor
Peter McKinnon, Ph.D., Associate 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., Assistant Professor
Jian Zuo, Ph.D., Associate 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, Tourettes'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. Faculty also study the potential protective effects of hypothermia on cerebral ischemic insults, Alzheimer's disease, and molecular mimicry in immune-mediated neurological disease.

Faculty:

M. LeDoux (head)	*Neurology*	R. Nelson	*Anatomy & Neurobiology*
A. Cantrell	*Anatomy & Neurobiology*	T. Nowak	*Neurology*
I. Dragatsis	*Physiology*	R. Pfeiffer	*Neurology*
E. Geisert	*Ophthalmology*	W. Pulsinelli	*Neurology*
R. Homayouni	*U of Memphis*	A. Reiner	*Anatomy & Neurobiology*
M. Jacewicz	*Neurology*	L. Reiter	*Neurology*
H. Kita	*Anatomy & Neurobiology*	R. Smeyne	*Anatomy & Neurobiology/St. Jude*
M. Levin	*Neurology*	R. Waters	*Anatomy & Neurobiology*
F-F. Liao	*Pharmacology*	J. Wheless	*Pediatric Neurology/Le Bonheur*

Neuro-oncology

Primary brain tumors and tumors metastatic to the central nervous system are relatively common and associated with tremendous morbidity and mortality. The most prevalent form of adult primary central nervous system tumors is collectively referred to as glioma, and the most common and devastating glioma is

glioblastoma multiforme. Despite dramatic improvements in neural imaging and neurosurgical techniques, the prognosis for high-grade gliomas has not improved significantly over the last 40 years. Clearly new therapies are needed to overcome the obstacles to treating brain tumors. The focus of the adult neuro-oncology group is to combine large-scale gene expression analysis of patients with brain tumors with cell and molecular studies of cell lines, tissues, and animal models of brain cancer. Research is directed towards the identification of genes associated with central nervous system tumors, understanding the mechanism by which genes affect intra- and extracellular tumor behavior, and the development of therapies that target these genes.

Faculty:

Jon Robertson (head)	*Neurosurgery*
F. Boop	*Neurosurgery*

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)	*Anatomy & Neurobiology*	P. Herron	*Anatomy & Neurobiology*
J. Callaway	*Anatomy & Neurobiology*	R. Nelson	*Anatomy & Neurobiology*
A. Cantrell	*Anatomy & Neurobiology*	R. Scroggs	*Anatomy & Neurobiology*
A. Dopico	*Pharmacology*	S. Tavalin	*Pharmacology*
W. Armstrong	*Anatomy & Neurobiology*	R. Waters	*Anatomy & Neurobiology*
M. Ennis	*Anatomy & Neurobiology*	R. Teruyama	*Anatomy & Neurobiology*

D. Heck	*Anatomy & Neurobiology*	S. Zakharenko	*Anatomy & Neurobiology/St.*
H. Kita	*Anatomy & 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)	*Anatomy & Neurobiology*	R. Scroggs	*Anatomy & Neurobiology*
J. Boughter	*Anatomy & Neurobiology*	R. Waters	*Anatomy & Neurobiology*
P. Herron	*Anatomy & Neurobiology*	Y.-H. Zhang	*Anatomy & Neurobiology*
E. Johnson	*Anatomy & Neurobiology*	R. Nelson	*Anatomy & Neurobiology*
C.-X. Li	*Anatomy & Neurobiology*	M. Fletcher	*Anatomy & 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	*Anatomy & Neurobiology*
M. Dyer	*Anatomy & Neurobiology/St. Jude*	M. Watsky	*Physiology*
M. Fitzgerald	*Anat./ Neurobiology/CBU*	J. Zuo	*Anatomy & Neurobiology/St. Jude*
R. Williams	*Anatomy & Neurobiology*	T. Rex	*Ophthalmology*
A. Iannaccone	*Ophthalmology*	J. Steinle	*Ophthalmology*
M. Jablonski	*Ophthalmology*		

Neurogenetics, Development and Evolution

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 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)	*Anatomy & Neurobiology/Pediatrics*	P. McKinnon	*Anatomy & Neurobiology/St. Jude*
J. Boughter	*Anatomy & Neurobiology*	G. Mittleman	*Anat./ Neurobiology/Univ. Memphis*
E. Chesler	*Oak Ridge National Labs*	G. Oliver	*Anatomy & Neurobiology/St.*

			Jude
A. d'Azzo	*Anatomy & Neurobiology/St. Jude*	M. Park	*Anatomy & Neurobiology*
I. Dragatsis	*Physiology*	A. Reiner	*Anatomy & Neurobiology*
A. Elberger	*Anatomy & Neurobiology*	L. Reiter	*Neurology*
K. Hamre	*Anatomy & Neurobiology*	B. Sharp	*Pharmacology*
M. Honig	*Anatomy & Neurobiology*	R. Smeyne	*Anatomy & Neurobiology/St. Jude*
R. Homanyouni	*University of Memphis*	R. Waters	*Anatomy & Neurobiology*
L. Lu	*Anatomy & Neurobiology*		
J. Morgan	*Anatomy & Neurobiology/St. Jude*		

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:

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

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	*Anatomy & Neurobiology*	S. Tavalin	*Pharmacology*
T. Yoo	*Medicine*	R. Waters	*Anatomy & Neurobiology*
J. Jaggers	*Physiology*		
M. Jablonski	*Ophthalmology*		

Translational Neuroscience

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

Focus 1: Neurodegenerative Diseases (Leader, M. 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). ***Dr. Ron Pfeiffer of UTNI and Department of Neurology is currently involved with a national study of the effectiveness of coenzyme Q10 in ameliorating Parkinson's Disease (see Appendix 4).*** 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. ***For the past 2 years, NI has funded $80,000 of Dr. LeDoux's Clinical Pilot Research grant on the genetics of dystonia, a neuromuscular degenerative disease. These funds were matched by the College of Medicine. Dr. LeDoux was recently awarded a 4-year R01 to study dystonia from NINDS ($1,295,000).***

Translational Research Areas:

The primary efforts of NI faculty have been in the areas of Parkinson's disease, Alzheimer's disease, Huntington's disease, 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. ***In the Spring of 2010, NI sponsored a symposium on Neuroprotection in Neurodegenerative Diseases (see Appendix 4).***

<u>Focus 2: Brain, Mind and Behavior (Leader, Burt Sharp, M.D, Chair, Pharmacology, UTHSC.)</u>

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%).

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. ***Over the past 2 years, NI committed $80,000 in research funds to this area for pilot research in support of Dr. Sharp and Matta's attempts to achieve a program project in the Developmental Effects of Drug Abuse from NIDA. In 2009, Dr.Sharp was awarded an NIH Grand Opportunity grant for $2,546,000 to identify how genes expressed in the brain make adolescents vulnerable to the addictive effects of nicotine. This project was in collaboration with NI member and Director of UT Center for Integrative and Translational Genomics (CITG), Robert Williams.***

Focus 3: Brain Development (Leader, Rob Williams, Ph.D.)

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. ***See Focus 2 above for Dr. Williams' collaboration with Dr. Sharp on the GO grant. In addition, in 2009, Dr. Williams was named to a UT-Oak Ridge National Laboratory Governor's Chair in Computational Genomics.***

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 that are 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. ***This past year, we awarded a second year of funding for a clinical Pilot Project (Dr. Kathryn MacVicar) in Pediatric Neurology, Le Bonheur Hospital/UTHSC, on serum protein analysis of autistic children. This project will run through 2011.***

- 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 some10% 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 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 UT is consistently productive, both in terms of peer-reviewed publications and participation in the national neuroscience community. Their competitiveness for extramural funding is the strongest possible measure of the faculty's excellence, as it reflects not only the quality of their research and publications, but also their national and international reputations. Lists of 1) peer-reviewed journal publications during the last academic year, as cited in PubMed, and 2) presentations at the 2009 meeting of the Society for Neuroscience in Chicago, IL, are presented in **Appendix 2**. These PubMed-cited publications do not include the many chapters, reviews and other articles written by UTNI faculty. Faculty members of UTNI 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 Program in Biomedical Sciences (IPBS) for students in the health sciences. Students matriculate into this integrated program, which in its first year requires broad interdisciplinary training in cell and molecular biology and in systems biology. Within the IPBS, 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. UTNI has switched from funding stipends for the first two years for students in the Neuroscience Track, to competitively awarding matching funds to students after they are placed in a mentor's

lab. UT has agreed to pay all IPBS stipends prior to placement in labs.

Students in the Neuroscience track take a sequence of several graduate courses. In the first year, students enroll in Cell and Molecular Biology, Neuroscience Seminar, Systems Biology (which includes the nervous system), and Neuroscience Student Symposium. In future years, each student continues with Neuroscience Seminar and Neuroscience Student Symposium and must take Functional Neuroanatomy. In addition, the student chooses two elective courses from among Cellular Neuroscience, Behavioral Neuroscience or Developmental and Molecular Neurobiology. 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 four laboratory rotations during the first year of graduate study in order to help them choose a research mentor. They typically 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 three to five years to complete.

During the past academic year, the NI supported one partial graduate student and awarded matching stipends to 9 others. In addition 7 postdoctoral fellows were supported with matching funds. Two graduate students previously supported by the NI were awarded the Ph.D., both within the Department of Anatomy and Neurobiology. 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

During the 2009-2010 academic year, the UTNI sponsored the weekly Neuroscience Seminar Series, hosting 26 seminars. Of these, 17 neuroscientists from outside UTHSC and 9 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 2009-2010 seminar speakers and their topics is provided in **Appendix 3**. In addition, the NI sponsored a Symposium on "Neuroprotection in Neurodegenerative Disease" with internationally renowned speakers Ira Shoulson, Joachim Herz, Eric Ahlskog and Tony Reiner. NI Co-Director Dr. Tony Reiner and Mike McDonald of NI organized the symposium and

mediated the proceedings. A flyer for the symposium can be viewed in **Appendix 4**, as can the flyer for a symposium during Brain Awareness Week, co-sponsored with the Urban Child Institute, on "Brain & Body: How the Immune System Makes a Smarter Brain". This symposium had over 100 attendees and received news coverage in the Commercial Appeal and the University Record (**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. While these goals are generally current, we have pursued fostering the development of clinical Neuroscience research the past 2 years, and will do so more in the coming year.

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. During the past academic year, 7 new faculty members became affiliated with the UTNI: ***Kanwakheet J.S. Anand, M.D., Ph.D., Max Fletcher, Ph.D., Scott Heldt, Ph.D, Francesca-Fang Liao, Michael Taylor, Ph.D., J. Paul Taylor, M.D., Ph.D., and Kazuko Sakata, Ph.D.***

1b. Renovations. NI had 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. ***This year we added a 220 V line and 2 independent 110 V lines to the room scheduled to house the Zeiss 710 confocal microscope in the Imaging Center.***

1c. Acquisition of equipment/Imaging Center In FY 2010 NI finished with startup funds for faculty initially recruited in 2002-2003, which went primarily for supplies and equipment in their laboratories. 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 (Kathy Troughton) 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. Our Bio-Rad confocal microscope is no longer covered by a service contract, and as mentioned previously, ***we have been awared a grant for a Zeiss 710 spectral scanning laser confocal scanning***

microscope this year to replace the BioRad. In FY 2010 we spent $25,000 to purchase a workstation for confocal image analysis (Imaris/Bitplane).

1d. Developing major programmatic activities. Several areas of research focus exist within the NI and are consolidated into eight research groups. These areas include: 1) Neurological and Neurodegenerative Disorders, 2) Neuro-oncology, 3) Vision and Retina, 4) Neurogenetics, Development and Evolution, 5) Sensory Information Processing, 6) Excitable Properties of Neurons, 7) Mental and Addictive Disorders and 8) 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.

In the Spring of 2006, we expanded three of these areas to include Translational Focus Groups: Neurodegenerative Diseases, Developmental Neurobiology, and Drug Abuse (Brain, Mind and Behavior). The goals and relationship of these focus areas to the other groups are detailed in Future Goals below.

NI has embarked on a mission to support the acquisition of large scale, programmatic grants by supporting Pilot Research grants, and to further clinical neuroscience research on campus. Current funded examples of the types of projects we seek are Dr. R. Williams Human Brain project, which established an informatics center for mouse neurogenetics. Dr. Williams was recently named to a Tennessee Governor's Chair in Computational Genomics through Partnership between Oak Ridge National Laboratory. NI supported members have recently acquired some large scale grants: NI support helped Burt Sharp receive an ***NIH Grand Opportunity (GO) grant for $2,546,000 to identify how genes expressed in the brain make adolescents vulnerable to the addictive effects of nicotine. Tonia Rex's project led to the funding of a a 3 year Vision Research Program grant from the Army Medical Research and Materiel Command and the Telemedicine and Advanced Technology Research Center (TATRC) ($757,328) and a one year award from the Glaucoma Research Foundation Shaffer Award ($40,000).***

1e. Creating a focal point to promote the exchange of information among our research faculty. The organization of the UTNI into research focus groups is a primary means of promoting interactions among NI faculty and students. In addition, there are several other 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 in Tennessee and nearby states.

2) The UTNI 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 26 seminars: 17 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.

3) Two web servers are housed in the UTNI. One 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, has been expanded and now includes all of the services offered by the Neuroscience Imaging Core, the efforts behind our Translational Neuroscience Research and Pilot Program initiatives, Neuroscience Undergraduate Scholars, Neuroscience Track students, among other items. The other server, is run by NI member Rob Williams and offers 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 Mouse Brain Library, Complex Trait Analysis, Virtual Microscopy, Web QTL Project, among others.

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. E. J. Johnson. 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 communications skills, mathematics, and science to the conduct of biomedical research.

2b. This year marks the fifth year for awarding ***Undergraduate Neuroscience Scholarships*** to outstanding undergraduates at Rhodes College and Christian Brothers University. In addition we have funded two Memphian undergraduates attending schools outside of Memphis, but who returned home for the summer and are interested in Neuroscience. The Rhodes and CBU scholars work on independent projects for their undergraduate thesis. The new scholars for 2010 are Heather Callaway from Emory Univ. (Dr. Robert Waters), Christine Petrin of Barnard College of Columbia Univ (Dr. Charles Leffer), Rachel Hassan of Rhodes College

(Dr. Larry Reiter) and Rachael Haag of CBU (Dr. Tonia Rex). One of last summer's 2 scholars, Cameron Kasmai, presented a poster at the Christian Brothers Research Day (**Appendix 4**).

2c. In 2009-2010 NI supported the stipends of 9 students. ***We also supported the recruitment of graduate students into the Neuroscience Trackof 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 updated flyer can be found in **Appendix 4.** We recently pledged matching funds for 7 Neuroscience Track students for FY 2010-2011.

2d. In 2009-2010 NI supported matching funds for 7 postdoctoral students, and have committed to 9 postdocs for 2010-2011.

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

3a. The Neuroscience Seminar series and Symposia encourage participation by the faculty, and collaborative research activities, especially those between basic scientists and clinical faculty. 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 two annual symposia (**Appendix 4**). Symposia this year featured "Neuroprotection in Neurodegnerative Disease" and, in collaboration with the Urban Child Institute "Brain and Body- How the Immune System Makes a Smarter Brain".

3b. Pilot Research and Other Projects funded by NI. During 2009-2010 the NI and its Executive Committee continued programmatic support of Neuroscience Research on campus. This included continued funding of two separate pilot project lines, one open to clinical and basic neuroscience research, and one only for patient-based research**.** We spent $81,137 this past FY, and we have committed $287,500 for FY 2010-2011. The clinical projects were matched by COM.

-**Basic Science**. In 2009-2010 the NI finalized support for neuroscience research projects aimed at developing large-scale NIH grants. Two investigators finished their second and final year of funding in Feb. 2009: Burt Sharp, M.D., Professor and Chair of Pharmacology; and Tonia Rex, Ph.D., assistant professor in Ophthalmology. Dr. Sharp's project led to the submission of a Program Project Grant from NIDA and to

attaining an ***NIH GO grant for $2,546,000 to identify how genes expressed in the brain make adolescents vulnerable to the addictive effects of nicotine. Tonia Rex's NI-funded project led to her receipt of a 3-year Vision Research Program grant from the Army Medical Research and Materiel Command and the Telemedicine and Advanced Technology Research Center (TATRC) ($757,328) and a one year award from the Glaucoma Research Foundation Shaffer Award ($40,000).***

-**Clinical Research.** The NI continued to fund 3 Clinical Neuroscience research pilot projects in 2009-2010 aimed at developing clinical scientists and facilitating their ability to achieve an NIH grant. Dr. Mark LeDoux, M.D., Professor of Neurology finished his second year of funding in Feb. 2009. Dr. Massroor Poucyrous, M.D., Professor of Pediatrics, is in her second year of funding. Dave Clarke, Assistant Professor of Pediatrics was awarded a grant but left the university before using any funds. Kathyrn MacVicar, Assistant Professor of Pediatrics, is in her second year of funding of her project on autism. ***Dr. LeDoux was recently awarded a 4-year R01 to study dystonia from NINDS ($1,295,000), based on research supported by NI.***

-**Neurotrauma Center**. The NI co-sponsored, with the College of Medicine, a Neurotrauma Center where ongoing clinical trials on head injury are being carried out. The NI supported the research coordinator of this Center, NI member Shelly Timmons, MD (Neurosurgery). Dr. Timmons received ~$19,800 from NI, an amount matched by the COM. Dr. Timmons left UTHSC in July of 2010. ***NI will continue to support traumatic brain injury research, and recently awarded a $50,000 1 year development project on Traumatic Brain Injury to NI co-director Dr. Tony Reiner, who is working in collaboration with the Department of Ophthalamology and the Trauma Center of the Shelby County Medical Center.***

-**Postdoctoral Research Awards.** The NI approved matching funds on a competitive basis for 7 postdoctoral fellows or research associates for FY 2009-2010. These awards are $15,000 each. We will fund 9 postdocs in FY 2010-2011 at the same level, and the call for applications can be found in **Appendix 5.** However, these funds are not shown on the Schedule 7 as they are being paid from economic stimulus funds passed from the federal government to the state under the ARRA.

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

Some UTNI faculty are involved in some large multi-institutional grant programs, involving a number of universities (listed above). There is considerable collaboration between UTNI 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 "Neuroprotection in Neurodegenerative Diseases" symposium in May of 2010 (**Appendix 4**), bring together clinical and basic research scientists from our various local sites and outside speakers.

The UTNI continued its community interaction with the First Year's Institute and the Urban Child Institute with a community forum during Brain Awareness Week at the Urban Child Institute. This program, entitled **"Brain and Body- How the Immune System Makes a Smarter Brain",** was directed toward parents, teachers, and other professionals involved in the care and early instruction of children. The program was organized by NI member Dr. Paul Herron, and was hosted by NI Director William E. Armstrong. Two talks were featured. Dr. Stacey Bilbo (Duke University) spoke on how early immune system challenging events shape brain development. Dr. Kristin Hamre of UTHSC spoke on critical periods during human brain development. Over 100 parents and healthcare professionals attended this event, which generated considerable discussion among the participants. The flyer on this Brain Awareness Week event is provided in **Appendix 4**, as are articles from the Commercial Appeal and the UTHSC Record.

APPENDIX 1

External Funding of Neuroscience Institute Faculty

FY 2009-2010

P.I.	*Project Name*	*Agency*	*Project Period*	*FY 2010 Direct Cost*
Armstrong, W.	Electrophysiological Correlates of Vasopressin secretion USPHS NS23941-19	NIH/NINDS	12/01/08 11/30/10	$40,245
Armstrong, W.	Electrophysiological Correlates of Vasopressin Secretion USPHS NS23941-19S1	NIH/NINDS	09/30/09 09/29/11	$105,001
Armstrong, W.	A Confocal Laser Scanning Microscope for Neuroscience Imaging Center USPHS 1S10RR027221-01	NIH/NCRR	05/31/10 05/12/11	$466,377
Bahouth, S.	PKA targeting: A novel mechanism for GPCR resensitization USPHS HL05848	NIH-HLB	12/16/08 11/30/12	$250,000
Boughter, J.	Genetic Dissection of a Motor Central Pattern Generator USPHS Grant NS-052366-02	NIH/NIDCD	01/01/08 12/31/10	$21,846
Boughter, J.	Sensory Coding in Taste USPHS Grant DC-000353-25	NIH/ NIDCD	08/01/08 7/31/10	$69,326
Boughter, J.	Ajinomoto Co Agmt-Boughter		04/01/09 03/31/11	$197,156
Chaum, E.	Plough Professorship in Vitroretinal Disease	Plough Foundation	11/30/99 ongoing	$83,383
Chaum, E.	Automated Screening for Diabetic Retinopathy by Content-Based Image Retrieval USPHS Grant EY 2 R01EY017065	NIH/NEI UT/*ORNL Collaboration	07/01/00 06/30/12	$1,308,961
Chaum, E.	Age-Related Eye Disease Study II (AREDS II) Clinical Center Award	NIH/NEI	06/01/06 12/31/12	$145,591
Chaum, E.	Molecular Responses to Oxidative Stress in the Retinal Pigment Epithelium Validation of Anti-Oxidant Effects on RPE Gene Expression	Private Industry ARF	06/16/08 01/21/11	$141,724

Chaum, E.	Training, Access, Education and Management for a Life that's Sugar Free (TEAM Sugar Free) – AL	Private Industry	09/01/07 08/31/11	$108,660
Chaum, E.	Senior Scientist Award	Research to Prevent Blindness Foundation	12/01/09 11/30/10	$75,000
Desiderio, D.	Chiesi Farmaceutici	Contract	03/30/07 05/31/10	$206,615
Desiderio, D.	Chiesi Farmaceutici	Contract	06/01/10 05/31/13	$28,209
Dohan, C.	Bachman Family gift	Private funding	Indefinite	$51,000
Dong, H.	Activity-Dependent Plasticity of Sensory Synapses in the Olfactory Bulb USPHS 5R03DC009049-03	NIH/NIDCD	07/01/09 06/30/10	$50,000
Dong, H.	Activity-Dependent Plasticity of Sensory Synapses in the Olfactory Bulb USPHS 5R03DC009049-03S1	NIH/NIDCD	08/14/09 07/31/10	$24,730
Dong, H.	Faculty Research Award		04/01/10 03/31/11	$10,000
Dopico, A.	Ethanol Actions on SLO Channels from Arteries vs. Brain USPHS AA11560-12	NIH/HLB	01/01/99 06/30/14	$237,500
Dopico, A.	Vasodilation Via selective Pharmacological Targeting on BK Channel Betal Subunits HL USPHS 104631-01	NIH/NIAAA	06/01/10 05/31/15	$266,064
Dragatsis, I.	Need for Huntingtin in the Mature CNS	CHDI Foundation, Inc.	05/01/08 04/30/11	$97,000
Dragatsis, I.	Role of NGF in Familial Dysautonomia USPHS NS061842-03	NIH/ NINDS	04/01/08 03/31/12	$216,563
Ennis, M.	Cornell Univ Subcont USPHS DC008702	NIH/NIDCD	07/01/09 06/30/10	$89,803

Ennis, M.	Metabotropic Glutamate Receptors in the Olfactory Bulb USPHS 5R01DC003195-14	NIDCD	01/01/10 12/31/10	$209,738
Foehring, R.	Slowy Inactivating K+ Channels in Neocortical Pyramidal Cells USPHS NS-044163-06	NIH/NINDS	07/01/09 06/30/10	$218,750
Geisert, E.	Modulators of Retinal Injury USPHS R01-EY017841-03	NIH/NEI	09/01/07 08/31/11	$250,000
Geisert, E.	Modulators of Retinal Injury R01-EY017841-03S1	NIH/NEI	09/01/09 08/31/10	$59,460
Geisert, E.	Core-Molecular Biology 5P3-OEY-013080-10	NIH/NEI	04/01/09 03/31/10	$191,768
Hamre, K.	Mapping Cerebellar Development In Time And Space USPHS HD-052472-05	NIH/NICHD	07/01/09 06/30/10	$561,218
Hamre, K.	Analysis Of Surviving Math1-Null Hair Cells In The Inner Ear Of Chimeric Mice ARRA-USPHS DC-009462-01A1S1	NIH/NIDCD	08/14/09 07/31/10	$55,000
Hamre, K.	Genome Exp Sub HHSN267200700050C		10/01/09 09/30/10	$90,477
Hamre, K.	Analysis Of Surviving Math1-Null Hair Cells In The Inner Ear Of Chimeric Mice USPHS DC-009462-02	NIH/ NIDCD	12/01/09 11/30/10	$148,500
Hamre, K.	Univ British Columbia Subcont AA-016666		02/01/10 01/31/11	$60,936
Hamre, K.	Faculty Research Award		05/01/10 04/30/11	$10,000
Heck, D.	Use of Dynamic Photostimulation to Investigate Synaptic Integration In Vitro USPHS Grant MH-079315-02	NIH/NIMH	07/01/08 06/30/10	$5,609

Heck,D./ Foehring, R.	Role of Inhibition In Shaping Neocortical Activity: Normal Vs Fmr1 Knockout Mouse USPHS Grant NS-057244-02	NIH/NICHD	03/01/09 02/28/11	$14,970
Heck, D.	Univ Memphis Subcont		08/01/09 07/31/10	$27,603
Heck, D.	Emory Univ Subcont USPHS NS067201		09/01/09 08/31/10	$117,043
Heck, D.	Coordination Of Orofacial And Respiratory Movements USPHS Grant NS-060887-02	NIH/NINDS	03/01/10 02/28/11	$218,750
Heck, D.	Univ Memphis Subcont NS063009		03/01/10 02/28/11	$74,457
Honig, M.	Sensory Axon Pathfinding USPHS Grant NS-034404-12	NIH/NINDS	07/01/09 06/30/10	$174,780
Iannaccone, A.	Epidemiology of Carotenoids Inflammation, and Genetic Markers in Age-Related Macular Degeneration	International Retinal Research Foundation	04/01/02 12/31/10	$182,552
Iannaccone, A.	Auto-Antibodies as Serum Biomarkers for Age-Related Macular Degeneration ARRA-USPHS Grant EY018416-01	NIH/NEI	08/01/09 07/31/11	$218,880
Jablonski, M.	Molecular Mechanism Underlying Macular Degeneration-subcontract	NIH/UCSD	06/01/09 05/31/11	$19,071
Jablonski, M.	Hydrogel Delivery of a Congenital Amaurosis	March of Dimes	06/01/09 05/31/12	$137,248
Jaggar, J.	Calcium channels in arterial smooth muscle cells USPHS HL094378-02	NIH/HLB	07/20/09 05/31/13	$250,000
Jaggar, J.	Calcium Signaling in Cerebral Arteries USPHS HL094378-02	NIH/HLB	04/01/01 03/31/13	$277,892
Johnson, D.	Core Grant for Vision Research USPHS 5P30 EY130800-10	NIH/NEI	04/01/05 03/31/11	$480,706

Johnson, D.	Core Grant for Vision Research USPHS 5P30 EY130800-10S1	NIH/NEI	09/01/09 08/31/11	$124,911
Kita, H.	Physiology and Anatomy of the Basal Ganglia USPHS Grant NS-042762-05	NIH/NINDS	12/01/05 11/30/09	$152,925
Kita, H.	Northwestern Subcont NS047085		08/01/09 07/31/10	$144,262
Kita, H.	Synaptic Transmission in the Basal Ganglia USPHS Grant NS-057236-03	NIH/NINDS	04/01/10 03/31/11	$175,000
LeDoux, M.	Univ Rochester NeuroSearch	Contract	08/15/08 03/31/10	$27,016
LeDoux, M.	INC MERZ 60201-0408	Clinical Trial	02/09/07 02/05/12	$14,280
LeDoux, M.	INC MERZ 60201-0433	Clinical Trial	02/09/07- 02/05/2012	$12,215
LeDoux, M.	Univ Rochester Sub-HP Therapeutics	Subcontract	07/01/05 06/30/10	$39,511
LeDoux, M.	Massachusetts General Hospital (2-CARE)	Contract	12/01/07 11/30/10	$38,549
LeDoux, M.	Boehringer Ingelheim	Clinical Trial	07/28/09 08/31/10	$14,689
LeDoux, M.	Bachmann Stauss I	Clinical Trial	07/01/09 06/30/10	$50,000
LeDoux, M.	Bachmann Strauss II	Clinical Trial	01/01/10 12/31/10	$25,000
LeDoux, M.	Massachusetts General Hospital (CREST-E)	Clinical Trial	07/01/08 06/30/11	27,891
LeDoux, M.	Emory Dystonia Sub NS065701	Subcontract	12/01/09 11/30/10	$23,333

Leffler, C.	Control of Neonatal Circulation USPHS HL034059-26	NIH/HLB	04/01/85	$250,000
Leffler, C.	Hydrogen Sulfide in Newborn Cerebral Circulation USPHS HL042851-20	NIH/HLB	08/16/91 07/31/15	$257,500
Liao, F.	New Roles for sAPP in Neuroprotection and Neurogenesis USPHS NS054880-05	NIH/NINDS	04/01/06 03/31/11	$216,290
Liao, F.	PTEN, Cell Cycle and Neurofibrillary Degeneration USPHS AG031893-02	NIH/NIA	04/01/08 03/31/13	$202,950
Lu, L.	Dresden Univ of Tech Svcs Contract		11/01/09 10/31/10	$66,000
Lu, L.	Penn State University Microarray Svcs Contract		01/01/10 12/31/10	$23,310
Malik, K.	Angiotensins, Prostaglandins-Adrenergic Interactions USPUS HL01934-34	NIH/HLB	09/01/77 03/31/13	$427,832
Malik, K.	Ecosanoids-Induced Vascular Growth During Injury HL079109-04	NIH/HLB	01/01/05 12/31/10	$237,045
Matta, S.	Gestational Drugs and Nicotine Self-Administration USPHS DA015525-05	NIH/NIDA	04/01/03 03/31/10	$213,340
McDonald, M.	Chronic Sialidase Effects on Amyloid Aggregation and Associated Pathology USPHS AG031253-01	NIH/NIA	02/15/09 01/31/10	$255,757
McDonald, M.	Gd3s Knockdown to Improve Cognitive And Motor Deficits In Models Of Parkinsonism USPHS Grant NS065063-02	NIH/NINDS	02/01/09 01/31/10	$113,677
McDonald, M.	Gd3s Knockdown to Improve Cognitive And Motor Deficits In Models Of Parkinsonism USPHS NS065063-02S1	NIH/NINDS	09/30/09 08/31/11	$39,476

Miller, D.	Treatment with KZ-41 and OTP promotes wound healing in a radiation combined injury USPHS AI080534-02	NIH/NIAID	08/01/09 07/31/10	$183,787
Miller, D.	GTx Bioanalytical Contract	GTx contract	02/01/06 09/30/10	$753,154
Nelson, R.	National Academy Science Nakfi		11/01/07 05/31/11	$10,663
Nelson, R.	Modulation of Primate Somatosensory Cortical Responses USPHS NS036860-13	NIH/NINDS	04/01/10	$194,906
O'Connell, K.	Cell Biology of Cardiac Kv Channels USPHS HL087591-04	NIH/HLB	02/17/09 01/31/12	$164,877
Parfenova, H.	Heme oxygenase and cerebral vascular injury USPHS HL099655-06	NIH/HLB	06/01/10 05/31/14	$250,000
Parfenova, H.	Cerebrovascular Stress and Circulating Endothelial Cells USPHS NS063936-01	NIH/NINDS	02/01/10 01/31/15	$218,750
Pfeiffer, R.	Univ Rochester NS37167	Contract	09/01/99 11/30/09	$2,926
Pfeiffer, R.	Univ Rochester NS050095	Contract	09/01/05- 12/31/09	$5,714
Pfeiffer, R.	Univ Rochester NS0046487	Contract	05/01/06 04/30/10	$18,369
Pfeiffer, R.	Northwestern Subcontract	Subcontract	05/01/09 04/30/11	$8,332
Pfeiffer, R.	Boehringer Ingel 248-538	Clinical Trial	02/17/05 12/31/10	$70,180
Pfeiffer, R.	Boehringer Ingel 248-595	Clinical Trial	10/10/06 12/31/09	$14,454
Pfeiffer, R.	PharmaNet 6002US025	Clinical Trial	01/11/06 12/31/10	$13,145

Pfeiffer, R.	EISAI Quintiles E2007-303	Clinical Trial	07/26/07 09/30/09	$13,642
Pfeiffer, R.	Cornell Subcontract	Subcontract	12/01/07 11/30/10	$9,600
Pfeiffer, R.	Schwarz Biosciences	Clinical Trial	10/18/07 12/31/10	$36,617
Pfeiffer, R.	I3 Res-Ingenix Pharm	Clincial Trial	03/18/08 12/31/10	$43,324
Pfeiffer, R.	University Rochester Sub-Molecular Biometrics	Subcontract	08/04/09 03/31/13	$5,304
Pourcyrous, M.	IVH Study Subcontract	NIH	06/01/09 05/31//11	$9,522
Reiner, A.	Neural Control of Choroidal Blood Flow USPHS Grant EY-005298-23		12/01/06 11/30/09	$227,302
Reiner, A.	Neuropathology and Pathogenesis of Huntington's Disease USPHS Grant NS-028721-15	NIH/NINDS	09/01/08 08/31/10	$74,879
Reiner, A.	Organization of The Cortical Projection to the Basal Ganglia USPHS Grant NS-057722-02	NIH/NINDS	03/01/09 02/28/10	$218,750
Reiner, A.	CHDI Foundation Research Agreement		03/15/10 03/14/11	$179,225
Reiter, L.	Proteomics in Drosophila to Identify Autism Candidate Substrates of Ube3a USPHS NS059902-02	NIH/NINDS	09/01/09 08/31/10	$216,724
Reiter, L.	Proteomics in Drosophila to Identify Autism Candidate Substrates of Ube3a USPHS NS059902-02S1	NIH/NINDS	09/01/09 08/31/10	$10,000
Reiter, L.	Angelman Syndrome	Grant	12/01/08 11/30/09	$29,495

Rex, T.	Systemic Delivery of a Neuroprotective Agent to Protect Against Glaucomatous Cell Death in the DBA2/J Mouse	Glaucoma Research Foundation (Shaffer)	02/01/10 01/31/11	$40,000
Rex, T.	Treatment of Traumatic Vision Loss in a New Mouse Model of Blast Injury	ARMY (TATRC)	09/01/10 09/29/13	$166,407
Sharp, B.	Interaction Between Nicotine and Stress USPHS DA03977-25	NIH/NIDA	03/31/85 12/31/10	$292,787
Sharp, B.	Neuron-Specific Candidate Gene Expression and Adolescent Vulnerability to Smoking USPHS DA028962-01	NIH/NIDA	09/30/09 08/31/11	$1,023,254
Steinle, J.	Role of Beta-Adrenergic Receptor Agonists in Therapies for Retinopathy Fdn Grant 2-2006-114	Juvenile Diabetes Research Foundation	01/01/06 03/31/11	$150,000
Steinle, J.	Pre-Clinical Testing of Isopropereal Eye Drops for NPDR Fdn-17-2008-144-Steinle	Juvenile Diabetes Research Foundation	09/01/08 08/31/10	$202,081
Steinle, J.	Greve Special Scholar Award	Research to Prevent Blindness	07/01/08 12/31/10	$30,000
Steinle, J.	Beta-Adrenergic Receptor Agonist Inhibit Diabetic Retinopathy	International Retinal Research Foundation	10/01/10 09/30/11	$62,000
Steketee, J.	Cortical Mechanisms of Cocaine Sensitization USPHS DA023215-02	NIH/NIDA	07/01/08 05/31/13	$198,000
Tavalin, S.	Regulation of Ionotropic Glutamate Receptors USPHS NS046661-04	NIH/NINDS	05/15/05 05/31/11	$153,487
Teruyama, R.	Epithelial Sodium Channels In The Supraoptic Vasopressin And Oxytocin Neurons USPHS HL-093728-02	NIH/HLB	08/01/09 07/31/10	$58,884
Teruyama, R.	Epithelial Sodium Channels In The Supraoptic Vasopressin And Oxytocin Neurons ARRA-USPHS Grant HL-093728-01S1	NIH/HLB	07/15/09 06/30/11	$8,103

Timmons, S.	Traumatic Brain Injury Clinical Trials Network USPHS 3U01HD042686-05S1, S2	NIH/NINDS	07/01/07 06/30/10	$162,500
Timmons, S.	VCU Subcont –Solvay	Clinical Trial	06/30/08 12/31/09	$834
Waters, R.	Fetal Alcohol Exposure and Sensorimotor Cortex Function USPHS 5R01AA013437-04	NIH/NIAAA	08/01/06 10/31/09	$8,855
Waters, R.	Brainstem Gustatory Processing USPHS DC00066-18	NIH/NIDCD	07/01/07 06/30/10	$118,789
Waters, R.	Mechanisms of Large-Scale Reorganization in Rat Forepaw Barrel Subfield Cortex USPHS NS055236-03	NIH/NINDS	05/01/10 04/30/11	$173,250
Watsky, M.	Development of an artificial innervated cornea for safety and efficacy testing	Univ. of Ottawa	05/01/07 06/30/11	$7,320
Watsky, M.	Vitamin D in the Cornea and Anterior Segment of the Eye USPHS EY017855-02	NIH/NEI	01/01/09 12/31/10	$112,500
Wheless, J.	Children with CAE Subcontract	NIH	11/01/05 07/31/10	$50,916
Williams, R.	Eli Lilly Co		12/01/07 03/31/11	$5,010
Williams, R.	Nantong University Services Contract		12/01/08 11/30/10	$32,500
Williams, R.	Systems Genetics of the HPA USPHS AA-017590-02	NIH/NIAAA	07/01/09 06/30/10	$156,712
Williams, R.	Informatics Center for Mouse Neurogenetics USPHS DA021131-10	NIH/NIDA	07/01/09 06/30/10	$840,551
Williams, R.	INIA: Robust Systems Genetics of Alcohol and Stress Effects on CNS USPHS AA-0143499-09	NIH/NIAAA	02/01/10 01/31/11	$251,706

Williams, R.	Mouse BIRN 442171760	Univ Calif Subcont RR021760 (UCLA)	05/01/09 04/30/10	$162,519
Zhou, F.M.	Regulation of Basal Ganglia Output Neurons USPHS NS058850-02	NIH/NINDS	09/01/08 08/31/13	$185,625
Zhou, F.M.	Non-Transporter Cocaine Mechanisms in Dopamine System DA021194-03	NIH/NIDA	09/01/07 06/30/11	$196,000
Total				**$19,353,152**

APPENDIX 2

Faculty Publications and Society for Neuroscience Presentations

FY 2009-2010

1) Peer-reviewed publications for 2009-2010 (cited in PubMed):

Adebiyi, A., Zhao, G., Narayanan, D., Thomas-Gatewood, C. M., Bannister, J. P. and **Jaggar, J. H.** "Isoform-selective physical coupling of TRPC3 channels to IP3 receptors in smooth muscle cells regulates arterial contractility." Circ Res **106**(10): 1603-12.

Alcalay, R. N., Mejia-Santana, H., Tang, M. X., Rakitin, B., Rosado, L., Ross, B., Verbitsky, M., Kisselev, S., Louis, E. D., Comella, C. L., Colcher, A., Jennings, D., Nance, M. A., Bressman, S., Scott, W. K., Tanner, C., Mickel, S. F., Andrews, H. F., Waters, C. H., Fahn, S., Cote, L. J., Frucht, S. J., Ford, B., Rezak, M., Novak, K., Friedman, J. H., **Pfeiffer, R.**, Marsh, L., Hiner, B., Siderowf, A., Ottman, R., Clark, L. N., Marder, K. S. and Caccappolo, E. "Self-report of cognitive impairment and mini-mental state examination performance in PRKN, LRRK2, and GBA carriers with early onset Parkinson's disease." J Clin Exp Neuropsychol **32**(7): 775-9.

Alcalay, R. N., Mejia-Santana, H., Tang, M. X., Rosado, L., Verbitsky, M., Kisselev, S., Ross, B. M., Louis, E. D., Comella, C. L., Colcher, A., Jennings, D., Nance, M. A., Bressman, S., Scott, W. K., Tanner, C., Mickel, S. F., Andrews, H. F., Waters, C. H., Fahn, S., Cote, L. J., Frucht, S. J., Ford, B., Rezak, M., Novak, K., Friedman, J. H., **Pfeiffer, R.**, Marsh, L., Hiner, B., Siderowf, A., Caccappolo, E., Ottman, R., Clark, L. N. and Marder, K. S. (2009). "Motor phenotype of LRRK2 G2019S carriers in early-onset Parkinson disease." Arch Neurol **66**(12): 1517-22.

Amlie-Lefond, C., Chan, A. K., Kirton, A., deVeber, G., **Hovinga, C. A.**, Ichord, R., Stephens, D. and Zaidat, O. O. (2009). "Thrombolysis in acute childhood stroke: design and challenges of the thrombolysis in pediatric stroke clinical trial." Neuroepidemiology **32**(4): 279-86.

Aquilina, K., **Clarke, D. F.**, **Wheless, J. W.** and **Boop, F. A.** "Microencephaloceles: another dual pathology of intractable temporal lobe epilepsy in childhood." J Neurosurg Pediatr **5**(4): 360-4.

Aquilina, K., Merchant, T. E., **Boop, F. A.** and Sanford, R. A. (2009). "Chiari I malformation after cranial radiation therapy in childhood: a dynamic process associated with changes in clival growth." Childs Nerv Syst **25**(11): 1429-36.

Aquilina, K., Merchant, T. E., Rodriguez-Galindo, C., Ellison, D. W., Sanford, R. A. and **Boop, F. A.** "Malignant transformation of irradiated craniopharyngioma in children: report of 2 cases." J Neurosurg Pediatr **5**(2): 155-61.

Armstrong, W. E., Wang, L., **Li, C.** and Teruyama, R. "Performance, properties and plasticity of identified oxytocin and vasopressin neurones in vitro." J Neuroendocrinol **22**(5): 330-42.

Arzimanoglou, A., French, J., Blume, W. T., Cross, J. H., Ernst, J. P., Feucht, M., Genton, P., Guerrini, R., Kluger, G., Pellock, J. M., Perucca, E. and **Wheless, J. W.** (2009). "Lennox-Gastaut syndrome: a consensus approach on diagnosis, assessment, management, and trial methodology." Lancet Neurol **8**(1): 82-93.

Asato, M. R., Manjunath, R., Sheth, R. D., Phelps, S. J., **Wheless, J. W.**, **Hovinga, C. A.**, Pina-Garza, J. E., Haskins, L. S. and Zingaro, W. M. (2009). "Adolescent and caregiver experiences with epilepsy." J Child Neurol **24**(5): 562-71.

Bannister, J. P., Adebiyi, A., Zhao, G., Narayanan, D., Thomas, C. M., Feng, J. Y. and **Jaggar, J. H.** (2009). "Smooth muscle cell alpha2delta-1 subunits are essential for vasoregulation by CaV1.2 channels." Circ Res **105**(10): 948-55.

Baquet, Z. C., Williams, D., Brody, J. and **Smeyne, R. J.** (2009). "A comparison of model-based (2D) and design-based (3D) stereological methods for estimating cell number in the substantia nigra pars compacta (SNpc) of the C57BL/6J mouse." Neuroscience **161**(4): 1082-90.

Bari, R., **Zhang, Y. H.**, Zhang, F., Wang, N. X., Stipp, C. S., Zheng, J. J. and Zhang, X. A. (2009). "Transmembrane interactions are needed for KAI1/CD82-mediated suppression of cancer invasion and metastasis." Am J Pathol **174**(2): 647-60.

Basuroy, S., **Bhattacharya, S.**, **Leffler, C. W.** and **Parfenova, H.** (2009). "Nox4

NADPH oxidase mediates oxidative stress and apoptosis caused by TNF-alpha in cerebral vascular endothelial cells." Am J Physiol Cell Physiol **296**(3): C422-32.

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Teruyama, R, Sakuraba, M, **Armstrong, WE**. Transient receptor potential channel M4 and M5 in vasopressin neurons in the rat hypothalamic supraoptic and paraventricular nuclei. *Neuroscience Abstract*, 2009.

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Xu, L, Furlotte, NA, George, EO, Berry, MW, Goldowitz, D, **Homayouni, R**. Gene-Set cohesion analysis tool: A literature based web tool for calculating functional cohesiveness of gene groups. *Neuroscience Abstract*, 2009.

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APPENDIX 3

Neuroscience Seminar Speakers

FY 2009-2010

NEUROSCIENCE SEMINAR SERIES
SCHEDULE

FALL 2009

Tonia S. Rex, Ph.D. September 15, 2009
Assistant Professor
Department of Ophthalmology
UTHSC

Title: "Gene Therapy for Inherited Retinal Degenerative Diseases"

Kristen M.S. O'Connell, Ph.D. September 22, 2009
Assistant Professor
Department of Physiology
UTHSC

Title: "Regulation of Cellular Excitability by Ion Channel Targeting: Localization-Function Analysis of Kv2.1"

Robert J. Ogg, Ph.D. September 29, 2009

Associate Member
St. Jude Children's Research Hospital
Department of Radiological Sciences
Division of Translational Imaging Research

Title: "Functional Neuroimaging in Children Treated for Catastrophic Diseases"

Andres Barria, Ph.D. October 6, 2009
Host: Steve Tavalin
Assistant Professor
Departments of Physiology & Biophysics
University of Washington

Title: "Trafficking and Regulation of NMDA-Receptors"

Lorin Milescu, Ph.D. October 13, 2009
Host: Reese Scroggs

Research Fellow
Department of Neurobiology
Harvard University

Title: "Exploring Neuronal Function of Ion Channels with Dynamic Clamp"

Alan C. Spector, Ph.D. October 27, 2009
Host: John Boughter
Professor of Psychology & Neuroscience
Department of Psychology
Florida State University

Title: "Linking Salt Taste Transduction to Behavior in Rodent Models"

Ariel Deutch, Ph.D. November 3, 2009
Host: Anton Reiner
Professor of Psychiatry & Pharmacology
Director, National Parkinson Foundation Center
Departments of Adult Psychiatry Research
Vanderbilt University

Title: "Regulation of Dendritic Spines: Lessons From and For Parkinson's Disease and Schizophrenia"

Evan S. Deneris, Ph.D. November 10, 2009
Host: Fu-Ming Zhou
Professor
Department of Neurosciences
Case Western Reserve University

Title: "Transcriptional Control of Serotonin Modulated Behaviors"

Jeremy D. Schmahmann, M.D. November 17, 2009
Host: Detlef Heck
Director, Ataxia Unit
Department of Neurology
Massachusetts General Hospital

Title: "Subcortical Disconnection Syndromes"

Stanislav S. Zakharenko, M.D., Ph.D. December 1, 2009
Assistant Member
Department of Developmental Neurobiology
St. Jude Children's Research Hospital
Assistant Professor
Department of Anatomy & Neurobiology
UTHSC

Title: "DiGeorge Syndrome and Synaptic Plasticity"

Russell N. Van Gelder, M.D., Ph.D. December 8, 2009
Host: Edward Chaum
Professor, Boyd K. Bucey Memorial Chair

Department of Ophthalmology
University of Washington

Title: "Adventures in Non-Visual Ocular Photoreception"

Jay S. Schneider, Ph.D. December 15, 2009
Host: Dr. Mike McDonald
Professor
Department of Pathology, Anatomy & Cell Biology
Thomas Jefferson University
Jefferson Medical College

Title: "Modeling the Cognitive Dysfunction in Parkinson's Disease"

SPRING 2010

Astrid A. Prinz, Ph.D. January 26, 2010
Host: Rob Williams
Assistant Professor
Department of Biology
Emory University

Title: "Mechanisms of Neuronal Robustness"

Gordon M.G. Shepherd, M.D., Ph.D. February 2, 2010
Host: Robert Foehring
Assistant Professor
Department of Physiology
Feinberg School of Medicine
Northwestern University

Title: "Microcircuit Organization of Mouse Motor Cortex"

Stephen C. Fowler, Ph.D. February 23, 2010
Host: Robert Waters
Professor
Department of Pharmacology
Senior Scientist
Life Span Institute
University of Kansas

Title: "Force Plate Methods for Measuring Rodent Dynamic Gait Abnormalities Induced by Neurological Disease or Drugs"

K.J.S. Anand, MBBS, D.Phil. March 2, 2010
Professor of Pediatrics, Anesthesiology, & Neurobiology
Chair for Critical Care Medicine
St. Jude Children's Research Hospital
Director of Critical Care

Le Bonheur Children's Medical Center
Division Chief, Pediatric Critical Care Medicine
UTHSC

Title: "Pain, Plasticity, and Prematurity: How do NICU Experiences Alter the Developing Brain?"

Robert C. Foehring, Ph.D. March 9, 2010
Professor
Department of Anatomy & Neurobiology
UTHSC

Title: "An Inordinate Fondness for Potassium Channels: Functional Roles of KV Channels in Neocortical Pyramidal Cells"

Kazuko Sakata, Ph.D. March 23, 2010
Assistant Professor
Department of Pharmacology
UTHSC

Title: "The Role of Promoter-Selective Gene Regulation of BDNF in Depression"

Stephen F. Traynelis, Ph.D. March 30, 2010
Host: Steven Tavalin
Professor
Department of Pharmacology
Emory University

Title: "Control of Glutamate Receptor Function by Phosphorylation"

Barry S. Winkler, Ph.D. April 6, 2010
Host: Tonia Rex
Professor of Biomedical Sciences
Eye Research Institute
Oakland University

Title: "Photoreceptor Cell Vulnerability and Glutathione Status"

Yehoash Raphael, Ph.D. April 13, 2010
Host: Jian Zuo
R. Jamison and Betty Williams Professor
Department of Otolaryngology
Kresge Hearing Research Institue
University of Michigan

Title: "Use of Developmental Genes for Inner Ear Therapy"

William J. Spain, M.D. April 20, 2010
Host: Detlef Heck
Professor of Neurology
University of Washington

Title: "Adaptation of Spike Time Precision: Implications for Sound Localization"

Hitoshi Morikawa, Ph.D. April 27, 2010
Host: William Armstrong
Assistant Professor
Section of Neurobiology
College of Natural Sciences
University of Texas at Austin

Title: "Dopamine Neuron Plasticity in Pavlovian Learning and Addiction"

James Putney Jr., Ph.D. May 4, 2010
Host: Jonathan Jaggar
Principal Investigator
Calcium Regulation Group

Title: "Function and Regulation of Store-Operated Calcium Channels"

Ella Bossy-Wetzel, Ph.D. May 11, 2010
Host: Fu-Ming Zhou
Associate Professor
Burnett School of Biomedical Sciences
University of Central Florida

Title: "Mitochondrial Fission and Fusion in Neurodegeneration"

TRANSLATIONAL NEUROSCIENCE SYMPOSIUM
May 21, 2010
"Neuroprotection in Neurodegenerative Diseases"

Ira Shoulson, M.D.
Professor and Louis C. Lasagna Professorship in Experimental Therapeutics
Departments of Neurology and Pharmacology and Physiology
University of Rochester

"Huntington's Disease: Clinical Precursors of Gene Expression"

Joachim Herz, M.D.
Professor and Thomas O. Hicks Family Distinguished Chair in Alzheimer's Disease Research
Department of Biophysics and Molecular Genetics
University of Texas Southwestern Medical School

"ApoE and ApoE Receptors in Alzheimer's Disease"

Eric Ahlskog, M.D., Ph.D.
Mayo Clinic

"Challenges and Realities of Neuroprotection Trials in Parkinson's Disease"

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

"Drug Therapy for Huntington's Disease"

APPENDIX 4

Neuroscience News, Events and Graduate Training Flyer

FY 2009-2010

THE NEUROSCIENCE INSTITUTE
UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

Clinical and Translational Science Institute

Translational Neuroscience Symposium

Neuroprotection in Neurodegenerative Diseases

Friday, May 21, 2010
10:00 - 2:30
Freeman Auditorium, Hamilton Eye Institute
930 Madison Building
Lunch will be provided

Joachim Herz, M.D.
UT Southwestern
"ApoE and ApoE Receptors in Alzheimer's Disease"

Eric Ahlskog, M.D., Ph.D.
Mayo Clinic
"Challenges and Realities of Neuroprotection Trials in Parkinson's Disease"

Tony Reiner, Ph.D.
UTHSC
"Drug Therapy for Huntington's Disease"

Ira Shoulson, M.D.
University of Rochester
"Huntington's Disease: Clinical Precursors of Gene Expression"

Objective: To expose faculty, residents, students and other health professionals to updates on new developments in neuroprotection in neurogedenerative diseases.

Department of Neurology

Methodist LeBonheur Healthcare is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

Methodist LeBonheur Healthcare designates this educational activity for a maximum of 4 AMA PRA Category 1 Credit ™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

Please Call 448-5960 for more information

THE
NEUROSCIENCE INSTITUTE
UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

Brain & Body: How the Immune System Makes a Smarter Brain

BRAIN AWARENESS WEEK
Get Connected

When

Thursday, March 18, 6:30 – 8:30 pm

Where

The Urban Child Institute 600 Jefferson Ave.

This program for the general public will feature two presentations by internationally known scientists on the early development of the brain and how the body's immune system continually "talks" to the brain. Dr. Kristin Hamre, a neuroscientist from the University of Tennessee Health Science Center, will give an overview of brain development, with an emphasis on critical periods and growth spurts. Dr. Staci Bilbo, our keynote speaker and a neuroscientist from the Duke University, will talk about how the immune system profoundly influences brain development, which has implications for cognitive functions as well as a number of neuropathological conditions. She will discuss how the brain-immune conversation occurs normally, as well as during illness, injury, or infection, and thereby has a continual and powerful influence on mood, motivation, and learning in both health and disease. Dr. William E. Armstrong, Director of the University of Tennessee Neuroscience Institute, will moderate the program.

THE URBAN CHILD INSTITUTE

This program is directed toward parents, teachers, and health professionals. Professional training hours (CEUs) will be provided by the UT Neuroscience Institute. For more information, contact Dr. Paul Herron, UT Neuroscience Institute (448-5824). Space is limited. Please pre-register with Ms. Brenda Williams, The Urban Child Institute (526-1822; bwilliams@theurbanchildinstitute.org). Attendance is free.

Plug Into Neuroscience!

Refreshments from 5:30-6:30 pm

THE COMMERCIAL APPEAL
Memphis, Tennessee
Printer-friendly story
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First Years: Learning is about brain connections

By Barbara Holden, Special to My Life

Tuesday, March 23, 2010

Children are born with all of the raw materials they need to learn and build a life of learning.

These materials are neural cells -- billions of them of them that developed even before they were born. In fact, babies arrive in the world with 99 percent of all the brain cells they'll have in life.

The question many parents have is: How do children learn?

There is a tremendous mystery in that question and what researchers know about the human brain. What is known is that parents and caregivers provide the environment to help young children utilize all of that raw material and construct the framework of learning.

They can most effectively do this by putting children as participants in active experiences that, in the process, make new neural cell and synapse connections and strengthen existing ones. Through these experiences, our brains develop the connections appropriate for learning and get rid of excess connections.

"The more you stimulate the brain the more a child is going to learn," says neuroscientist Dr. Kristin Hamre of the University of Tennessee Neuroscience Institute. "In the early years, children are like sponges -- they will soak up everything. Put them in the right situations and they are going to make connections. They are going to learn things incredibly fast a lot of the times."

Neuroscientist Paul Herron with the University of Tennessee Neuroscience Institute explains how a young child's brain grows to the size of an adult's:

"Neuronal cell bodies grow branches like those on trees, called dendrites, and begin to communicate with one another through specialized cable-like wiring called axons. The axons create contacts with other neurons, called synapses, which enable communication between neurons and, thus, the origin and development of sensibilities, motor activities, curiosity, learning and memory."

In addition to loving nurture, parents and caregivers can stimulate and strengthen connections by employing a strategy of active rather than passive development. Of course, we all learn more by doing.

"Sesame Street is great for helping children learn things," Hamre says. "That is because (children) watch them do things and then repeat back what they have heard. That is part of being actively engaged. You're not just passively sitting there watching something happen. The activities should involve the physical, cognitive and sensory levels."

Parents of very young children can support this plan in many ways. One is by arranging in their homes and yards for safe exploration and play; by creating rituals and routines for meals, naps and play; and by making arts and writing supplies for activities.

Through exposure to new and repeat experiences, our children are learning. In scientific terms, they are making and strengthening neural connections.

In practical terms, they are using the raw materials they were born with to build a life of learning.

Barbara Holden is a director at the Urban Child Institute, a Greater Memphis organization dedicated to promoting early childhood development. The Commercial Appeal is a partner with the Urban Child Institute in this effort to help parents and other care givers learn skills that nurture and educate the minds of infants and children. For more information, go to theurbanchildinstitute.org or dial 211 for the Public Library and Information Center.

COD Offers Free Dental Screenings

Organizers at the 15th Annual Sisterhood Outreach Summit and Showcase relied on the UT College of Dentistry to provide free dental screenings. Directors of the showcase parterned with the college to conduct the dental screenings and provide attendees with oral health care information and dental products on June 5 and 6 at the Memphis Cook Convention Center.

The College of Dentistry participated once again in the success of the Sisterhood Outreach Summit and Showcase where they conducted 441 dental screenings and provided information on dental care to attendees.

The College of Dentistry has participated in the event for several years and 2010 was no different. This year the team of dental professionals and students conducted 441 dental screenings. The wait time was fairly short and screenings lasted about 10 to 20 minutes, unless participants had specific questions or dental needs.

The team encouraged participants to schedule regular screenings with their dentist or with the College of Dentistry patient care clinic. Dental professionals recommend an annual dental screening for children and adults to prevent pain and suffering due to dental problems and to encourage early dental treatment.

The Sisterhood Outreach Summit and Showcase is presented by Grace Magazine and was created to show women positive ways to change their lives. This year's theme was "Forged in the Fire of Excellence." More than 30,000 people attend the annual event.

For more information on the College of Dentistry patient care clinic hours of operation and services offered, please call (901) 448-6468.

Dr. Oz Brings Health Care Wizardry to Memphis

Through the joint partnership between Methodist Healthcare, the University of Tennessee Health Science Center, and Columbia University Medical Center, Mehmet Oz. MD, professor of cardiac surgery at Columbia University Hospital and host of "The Dr. Oz Show," brought his message of community and personal health and wellness to the Memphis Botanic Garden. On June 10, nearly 200 health care providers, community leaders and special guests gathered in Hardin Hall for an early morning, invitation-only event.

"I'm here to discuss how you as health care providers can partner with the media to promote better health," Dr. Oz noted. "I want to share the lessons I've learned and the mistakes I've made in getting people to talk about health.

"One the most important lessons is people don't change because of what they know. They change based on what they feel," he stressed. "We have to drive change in our patients not by giving them information that may or may not be new to them. We have to get patients to care about themselves as much as their doctors and their families care about them. Then we can give them the information that heads them in the right direction."

Dr. Oz said talk-show maven and business mogul Oprah Winfrey taught him, "Emotion drives 90 percent of change. If we can get patients to care, we can provide them with upbeat messages, engaging factoids and news they can use to drive transformation in how they take care of their own health. That's powerful change."

"Improving the health and well-being of our patients is part of our DNA," said Gary Shorb, president and CEO of Methodist Le Bonheur Healthcare. "As a faith-based institution, we have an unconditional concern and care for the population we serve.

"We are pleased to have Dr. Oz bring his expertise in health education and disease prevention to our community," Shorb continued. "And we are especially pleased with our partners at Methodist and the University of Tennessee for providing such tremendous value."

"We are partners with the Methodist Healthcare System and with Columbia University Medical Center because we are committed to dramatically improving the quality of cardiovascular care and education for this region," observed Interim Chancellor Schwab. "We know that is an achievable goal because it is through this kind of partnership that Methodist and UT have built a Transplant Institute that is one of the top 10 solid organ transplant units in the U.S. We want to bring that same high level of care to cardiovascular patients in the Mid-South."

Brain Awareness Week Symposium 2010

Nationally celebrated Brain Awareness Week was recently observed by UTHSC. Dr. Kristin Hamre (left) and Dr. Staci Bilbo (right) lectured on the brain and the body's immune system. Dr. William Armstrong, PhD (center), professor of Anatomy and Neurobiology and director of the Neuroscience Institute helped lead the symposium.

Every year, UTHSC celebrates Brain Awareness Week, a worldwide initiative that unites the efforts of universities, hospitals, patient groups, government agencies, schools, service organizations and professional associations.

The Neuroscience Institute and the Urban Child Institute featured two presentations by internationally known scientists on the early development of the brain and how the body's immune system continually "talks" to the brain.

Kristin Hamre, PhD, neuroscientist from UTHSC, talked about early brain development with an emphasis on critical periods and growth spurts. She also discussed how the nervous system is vulnerable to a variety of insults during these growth spurts.

Staci Bilbo, PhD, keynote speaker and a neuroscientist from Duke University, spoke about how the immune system profoundly influences brain development, which has implications for cognitive functions as well as a number of neuropathological conditions.

Dr. Bilbo discussed how the brain-immune conversation occurs normally, as well as during illness, injury, or infection, and thereby has a continual and powerful influence on mood, motivation, and learning in both health and disease.

Kenneth Allen Campbell

A photo caption in the March – April issue of *The Record* incorrectly identified Kenneth Allen Campbell. Campbell passed away on November 12, 2009, at Methodist University Hospital.

Kenneth Allen Campbell

Kenny began at UTHSC 24 years ago. He worked in the Print Shop, Accounting and the Department of Medicine. He is survived by his beloved wife of 10 years, Edie Campbell.

Cameron Kasmai of Christian Brothers University presents a poster of his work sponsored by NI and Dr. Detlef Heck, at the CBU annual research day, April, 2010.

NI Director William Armstrong Receives Grant From NIH/NCRR

Armstrong Receives Grant for Confocal Laser Scanning Microscope

William E. Armstrong, PhD, professor of Anatomy and Neurobiology, and director of the Neuroscience Institute, has been awarded a grant for $466,377 from the National Center for Research Resources, one of the National Institutes of Health.


Dr. William Armstrong

The award, issued under the American Recovery and Reinvestment Act of 2009, will be used to purchase a confocal laser scanning microscope with spectral scanning capability for the Neuroscience Imaging Center at UTHSC. The full grant will be paid in 2010.

In a confocal laser scanning microscope, a laser beam passes through a light source aperture and then is focused by an objective lens into a small (ideally diffraction limited) focal volume within or on the surface of a specimen. In biological applications especially, the specimen typically contains fluorescent labels.

Confocal laser scanning microscopy is a technique for obtaining high resolution optical images with depth selectivity. The key feature of confocal microscopy is its ability to acquire in-focus images from selected depths, a process known as optical sectioning. Images are acquired point-by-point and reconstructed with a computer, allowing three-dimensional reconstructions of topologically complex objects.

"The features of this particular laser scanning confocal microscope are its enhanced sensitivity over predecessors, and especially its ability to spectrally scan biological tissues for multiple fluorescent markers, with up to 34 channels, and with 10 nm [nanometers] of wavelength resolution," said Dr. Armstrong. "This means scientists can separate and quantify the simultaneous emissions from fluorescent markers, even when they do not look different to the naked eye. This gives significant flexibility in the number and type of fluorophores that investigators can choose from as biomarkers within a single tissue section," he explained.

In the Neuroscience Imaging Center, neuroscientists focus on discovering the anatomy of brain areas using shared equipment such as electron, light and confocal microscopes, and the computer-assisted quantification of neuron number, location and morphology. This imaging center is critical for understanding basic brain function as well as its impairment from injury or disease.

Alum Becomes President of National Doctors Association

On April 24, J. Fred Ralston, Jr., MD, FACP, an internist from Fayetteville, Tenn., took office as president of the American College of Physicians (ACP), the nation's second-largest physician organization. His term began during Internal Medicine 2010, the ACP annual scientific meeting in Toronto, Canada.


Dr. J. Fred Ralson, Jr.

As president, Dr. Ralston will be the senior elected officer of ACP. During his one-year term, he will preside at all meetings of the ACP membership, serve on eight ACP committees and represent ACP at national and international chapter meetings and public functions.

Dr. Ralston has been in the practice of general internal medicine in Fayetteville, Tenn., since 1983. His group, Fayetteville Medical Associates, includes internists, family physicians, pediatricians and a nurse practitioner. The group traces its roots to 1909 and serves a rural county of 30,000 near Huntsville, Ala.

Dr. Ralston has served in many leadership capacities for the Tennessee Medical Association, including a term as board chairman. He was chairman of the TMA TennCare Reform Task Force and is involved in many community activities. Dr. Ralston has also served as a board member and has held many leadership roles on the medical staff of Lincoln Medical Center in Fayetteville. He was actively involved in a public referendum, which succeeded with overwhelming approval for a new community hospital.

Dr. Ralston has a strong interest in electronic health records, efficiency in health care delivery and health care system reform focused on a close relationship between individuals and a personal physician. Dr. Ralston was chair of the ACP Health and Public Policy Committee from 2007-2009.

A graduate of Phillips Academy in Andover, Mass., Dr. Ralston received his BA in political science from Yale University. He earned his medical degree in 1980 from UTHSC College of Medicine and completed internal medicine residency training at Baptist Memorial Hospital in Memphis. He is board-certified in internal medicine. Dr. Ralston is married to Farris Lynch Ralston and they have twin teenage sons, Will and Jim.

GRANTS

Congratulations to the following UTHSC team members who have recently received grants totaling more than $5,000.

William Armstrong, PhD
NIH-National Center for Research Resources
"A Confocal Laser Scanning Microscope for Neuroscience Imaging Center"
$466,377

Alejandro Dopico, MD, PhD
NIH-National Heart, Lung and Blood Institute
"Vasodilation via Selective Pharmacological Targeting of BK Channel Beta 1 sub-units"
$390,127

Daniel Kestler, PhD
Susan G. Komen for the Cure
"Development of ODAM as a Biomarker in Breast Cancer"
$575,983

Tiffany Seagroves, PhD
NIH-National Cancer Institute
"The Role of HIF-1alpha in Breast Cancer Stem Cell Activity"
$299,800

Deborah Elizabeth Soeliner, PhD
NIH-National Institute on Drugs Abuse
"Gestational Ethanol and Neural Mechanisms of Adolescent Nicotine Reinstatement"
$45,590

Jena Steinle, PhD
University of Tennessee Research Foundation
"Beta-Adrenergic Agonist Used to Treat and Prevent Blindness in Diabetic Patients"
$15,000

Micheal Storm, PhD
University of Tennessee Research Foundation
"Development of a Prototype Flavored, Pharmacetically Elegant, Liquid Emulsion or Suspension of De-odorized Omega-3 Polyunsaturated Fatty Acid Appropriate for Pediatric Patients"
$15,000

Yao Sun, MD, PhD
NIH-National Heart, Lung and Blood Institute
"Regulatory Mechanisms of Oxidative Stress in Cardiac Angiogenesis Post-infarction"
$370,000

View UTHSC News Notes

Catch up on UTHSC media coverage by visiting http://www.uthsc.edu/news/newsnotes/. News Notes is a periodic e-mail that shares good news coverage of the Health Science Center.

These e-mail updates provide a brief summary of media exposure that faculty, staff and students have received, as well as providing links (when available) for more information.

UTHSC Researchers Begin Parkinson's Study

Researchers at UTHSC are recruiting participants for a national clinical study of medication that could slow the progression of Parkinson's disease.

The study, referred to as "QE3," will examine the effectiveness of the research medication Coenzyme Q10 (CoQ). During the study, investigators will administer high doses of CoQ to participants 30 years of age or older with early stage Parkinson's disease to reduce the speed of their physical decline.

The research is sponsored by the National Institute of Neurological Disorders and Stroke, a division of the National Institutes of Health (NIH), and will be conducted by the Parkinson Study Group, an international council of physicians and researchers experienced in caring for Parkinson's patients and studying the disease.

In Memphis, Ronald Pfeiffer, MD, a neurologist at UTHSC and a member of the Parkinson Study Group, will lead the local effort of this phase III clinical trial.

"Memphians who have been diagnosed with Parkinson's disease within the last five years and are not receiving treatment for their symptoms may be eligible for the study," said Dr. Pfeiffer. Assigned physicians will examine study volunteers every four months during a 16-month period.

Participants will be randomly assigned to receive treatment with either active CoQ (which will also contain vitamin E) or a matching placebo. Investigators at 60 clinical sites in the United States and Canada will enroll about 600 participants with early signs of Parkinson's disease.

Dr. Ronald Pfeiffer

Each site will enroll approximately 10 individuals. There is no cost to participate in the study.

In Parkinson's disease, the brain cells that produce a chemical called dopamine are gradually lost, resulting in a decrease in dopamine levels. Without enough dopamine, patients experience symptoms such as tremors, muscle rigidity, balance problems and slow movement.

Currently, doctors can treat these symptoms with drugs that boost dopamine levels. However, there are no available treatments to reduce the rate of clinical decline. "A medication that could slow the progression of Parkinson's disease would be a major breakthrough for patients living with the disease," said Walter Koroshetz, MD, deputy director, NIH National Institute of Neurological Disorders and Stroke.

Adults 30 years old and above with early stage Parkinson's disease who wish to participate in the study should contact Brenda Pfeiffer, UTHSC research nurse coordinator, at (901) 271-5966.

Cohen Reads to UT Patients

U.S. Rep. Steve Cohen visited UT Medical Group, the private practice arm of UTHSC College of Medicine faculty, to read to young patients as part of the Reach Out and Read national children's literacy program.

Grants cont. from page 15

Alie Kanu, PhD
NIH-National Heart Lung and Blood Institute
"Eicosanoids and Carbon Monoxide in Neonatal Cerebral Microcirculation"
$107,534

Seema Khurana, PhD
NIH-National Institute of Diabetes and Digestive and Kidney Disease
"ARRA-Regulation of Epithelial Cell Homeostasis by Actin Microfilaments"
$372,259

Charles Mansbach, MD
NIH-National Institute of Diabetes and Digestive and Kidney Disease
"A Cell Biological Approach to Lipid Absorption"
$49,903

Isao Miyairi, MD
NIH-National Insitute of Allergy and Infectious Diseases
"ARRA-System Genetics of Immune Pathways Induced by Chlamydia"
$214,800

Diedra Mountain
American Heart Association
"Hormone Replacement Therapy: Modulation of Vascular Wall Structure and Remodeling Post-Injury"
$77,000

Anjaparavanda Naren, PhD
NIH-National Institute of Diabetes and Digestive and Kidney Disease
"ARRA-Inhibition of an Apical cAMP Transporter (MRP4) in the Gut Induces Diarrhea"
$71,755

Christopher Nosrat, PhD
NIH-National Institute on Deafness and Other Communication Disease
"ARRA-Neurotrophin Specificity and Function in the Taste System"
$151,293

Andrzej Tadeusz Slominski, MD, PhD
National Science Foundation
"ARRA-UV-Light Regulation of Skin Endocrine Function: POMC System"
$498,424

Gabor Tigyi, MD, PhD
NIH-National Insitute of Allergy and Infectious Diseases
"ARRA-Development of a Novel Gastrointestinal Radiomitigator"
$449,896

UTHSC
NIH-National Institute of Arthritis Musculoskeletal and Skin Disease
"The Pigmentary System: Securing a Place in the sun"
$17,000

Zhaohui Wu, MD, PhD
Leukemia Research Foundation
"TAKI function in NF-kB Signaling by Cancer Therapeutic Agent"
$100,000

Fu-Ming Zhou, MD, PhD
NIH-National Institute of Neurological Disorders and Stroke
"Regulation of Basal Ganglia Output Neurons"
$270,765

APPENDIX 5

Call for Applications:

Research Support Grants

Postdoctoral Research Awards

THE NEUROSCIENCE INSTITUTE
UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

Neuroscience Institute (NI) Research Support Grants

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

Method of Support by NI: The NI will provide funds for animals, supplies, small equipment, and salaries for non-tenure track research staff. Support will be for a maximum of 1 year. Applicants may request funds for all three items, or any subset.

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

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

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

NI Application for Support:

1. Three page electronic application (PDF) that identifies the PI and other key personnel, a brief description of the project, and itemized budget (personnel, equipment, and supplies).
2. The PI and key collaborators should append to the application a PDF of NIH format biosketch that includes current funding, including any UTHSC support if applicable.

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

Deadline: Oct. 1, 2010. Submit electronic (PDF) copies to:

Michele Tungsvanich
Administrative Assistant, NI
Email: mgarr@uthsc.edu
Phone: 901-448-2684

For questions, please contact William Armstrong (warmstro@uthsc.edu) or Michele Tungsvanich (mgarr@uthsc.edu).

THE UNIVERSITY OF TENNESSEE
Health Science Center

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May 25, 2010

Neuroscience Institute (NI) Postdoctoral Research Support

Purpose and Eligibility: The NI solicits proposals for matching funds from postdoctoral fellows or research associates whose mentors are members of NI. Mentors should be currently funded or working on a no-cost extension of a competitively renewable grant. Postdocs or research associates whose mentors are currently receiving NI pilot project money are ineligible for this award.

Although we try to rotate funding, postdocs or research associates currently on NI matching support are not excluded from a second year of support. These fellows should submit a short (no more then 2 pages) progress report from the current year of work, including any publications, seminars given, and attendance at NI activities such as weekly seminars and symposia.

Support: The NI will provide $15,000 matching funds to NI members, to be used toward the salary/fringe of each awarded applicant for FY 2011. We anticipate making 5 awards.

Application for Support:

1. The applicant should provide a cover letter requesting support with a brief summary of current research projects. A current CV should be attached to the cover letter. These documents should be submitted electronically as PDF files.

2. The applicant should request two letters of reference, one of which must come from the mentor. The mentor's reference letter should also identify the source of matching funds for the applicant. Reference letters may be emailed. The mentor's letter should have a short, NIH style biosketch attached.

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

Deadline: **June 20, 2010**. Awards will run from July 1, 2010-June 30, 2011.

Submission: Please send all materials electronically to:
Michele May, Administrative Assistant
Neuroscience Institute
mgarr@uthsc.edu
Phone: 448-2684