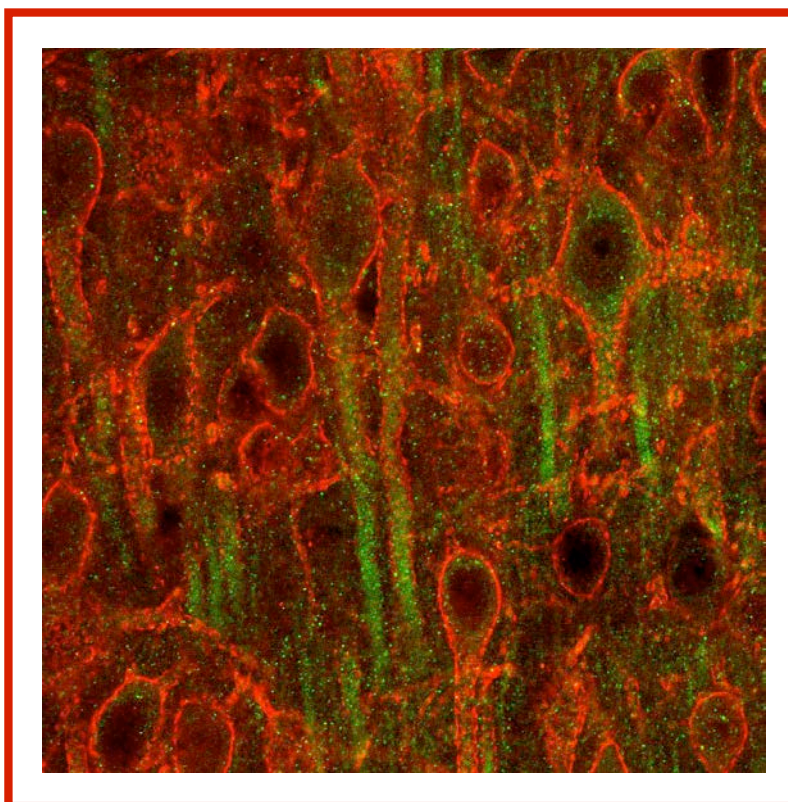




THE
NEUROSCIENCE INSTITUTE

UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

Neuroscience Center of Excellence



Annual Report to the
Tennessee Higher Education Commission
Fiscal year 2006-2007

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I. ADMINISTRATIVE STRUCTURE

Director: William E. Armstrong, Ph.D.
Professor and Chair (Interim)
Department of Anatomy and Neurobiology

Administrator: Brenda Smith

IT Specialist: Brandy Fleming

Business Manager: Jeff Jones

Neuroscience Executive Committee:

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

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

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

Burt Sharp, M.D., Van Vleet Professor and Chairman, Department of Pharmacology

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

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

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

Dan Goldowitz, Ph.D., Methodist Professor, Department of Anatomy and Neurobiology and Director, Molecular Resource Center, UTHSC

Tony Reiner, Ph.D., Professor, Department of Anatomy and Neurobiology

Center Address:

University of Tennessee Health Science Center

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Memphis TN 38163

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Organizational Structure:

The Neuroscience Center of Excellence comprises the administrative core and financial engine of the University of Tennessee Neuroscience Institute (UTNI), which is located within the organizational structure of the University of Tennessee system under the College of Medicine at the UT Health Science Center (UTHSC)

in Memphis. The UTNI is under the supervision of the Neuroscience Center of Excellence Director Dr. William E. Armstrong. Dr. Armstrong succeeded Dr. David Smith, who died in September of 2006. The Director answers directly to the Executive Dean of the College of Medicine, Dr. Dean Steven Schwab, and to the Chancellor (Interim) of the UTHSC campus, Dr. Herschel (Pat) Wall. Faculty of the UTNI are housed within twelve different departments in the College of Medicine and in several other UT departments. Affiliated faculty reside at UT Knoxville, St. Jude Children's Hospital, and at the University of Memphis. The NI staff includes shared clerical and budget personnel (Ms. Brenda Smith and Mr. Jeff Jones, respectively), a full-time IT specialist (Brandy Fleming) and a Full Time Technical Director of the Neuroscience Imaging Core (Kathy Troughton).

II. BUDGET (see detail, page 5)

A. 2006-07. The FY 2006-07 appropriated budget for the UTNI was \$647,600. We carried forward \$85,036 from the previous year for a total budget of \$732,663. This past fiscal year, we expended \$414,959 in total personnel costs, which included 2 graduate student stipends and 1 postdoctoral stipend, personnel plus appropriate fringe benefits. Personnel costs include the administrative supplements for the Director, supplements for clerical support (shared with Anatomy and Neurobiology), full-time IT specialist and full time Technical Director of Imaging Facility. Four new tenure-track neuroscientists were recruited into the Department of Anatomy and Neurobiology since 2002, and the UTNI provided \$500,000 toward startup funds for these investigators. There still remains a continuing startup obligation to these investigators of \$100,000, most of this should be spent in the coming year. Additional funds went to support the Neuroscience Seminar series, the Brain Awareness Symposium in collaboration with the Urban Child Institute, three Translational Neuroscience Symposia, and supplies for an NI instructor (Dr. Paul Herron) to teach a course in brain development to city child care workers at the Urban Child Insitute.

B. 2007-2008. Although we will carryover \$317,704 to the coming fiscal year, this number does not yet reflect the student stipends for FY 2006-07 (*i.e.*, we have yet to be billed for these by the College of Graduate Health Sciences), nor does it reflect the encumbered start-up packages (see above) Here is a breakdown of our anticipated projects:

Students: In the coming year, we will continue to support graduate students (our commitment to the Graduate College is for 10 stipends/year @ \$21,000/stipend).

Seminar Series and Community Outreach: We will continue to fund the weekly Neuroscience Seminar series and will also sponsor two Translational Neuroscience Symposia in the course of the academic year, where clinical and basic scientists present complementary research on any of the 3 focus areas. We will continue to

work with the Urban Child Institute to fund community outreach activities such as Brain Awareness Week, and a course in Brain Development for child-care workers. 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.

Neuroscience Imaging Center: We will contribute \$20,000 to the installation of a shared Solamere Systems Spinning Disk Confocal microscope awarded to NI member Jon Jaggar by NIH. Many NI members were Major Users in this application. We will invest another \$18,000 upgrading the NeuroLucida workstation in the Neuroscience Imaging Center to include a package for unbiased stereological measurement, requested by several NI members.

New NI Faculty: We have committed 4 years of partial salary support to Dr. Mike McDonald (\$90,000 over 4 years), a new hire 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.

Bridge and Seed Funding: The payline at the National Institute of Neurological Disease and Stroke (NINDS), where many NI members receive grants, is *below 10%*! This is about ½ of what this value was five years ago. The result is that many previously and consistently funded faculty find themselves “in between”- their grants are receiving scores that might have been fundable in the past. To assist these scientists, the NI has combined efforts with the UTHSC research office to insure these scientists can be productive, and keep personnel, during this period. We have matched UTHSC funding for two faculty members with NI support for FYI 2007-2008. We will also use this carryover to support the seed packages for new NI faculty members. These packages will be used to assist those originating from the home department.

Pilot Projects: The NI will use \$150,000 to support pilot research projects aimed at developing research grant applications. In particular, the projects should represent collaborative efforts among NI members across disciplines and departments. These projects should also be focused on obtaining multi-investigator type grants, such as Core grants, or Program Project grants.

Schedule 7

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

Institution UT Health Science Center Center Neuroscience

	FY 2006-07 Actual			FY 2007-08 Proposed			FY 2008-09 Requested		
	Matching	Appopr.	Total	Matching	Appopr.	Total	Matching	Appopr.	Total
Expenditures			0			0			0
Salaries									
Faculty	101,509	81,417	182,926	107,988	117,882	225,870	113,387	123,776	237,164
Other Professional		130,277	130,277		150,969	150,969		158,517	158,517
Clerical/ Supporting		7,855	7,855		8,025	8,025		8,426	8,426
Assistantships		3,417	3,417		200,000	200,000		210,000	210,000
Total Salaries	101,509	222,966	324,475	107,988	476,876	584,864	113,387	500,720	614,107
Longevity		4,165	466,024		4,500	943,858			991,051
Fringe Benefits	30,452	69,535	99,987	35,189	73,011	108,200	36,948	76,662	113,610
Total Personnel	131,961	296,666	890,486	143,177	554,387	1,636,922	150,336	577,381	1,718,768
Non-Personnel									
Travel		26,141	26,141		35,000	35,000		36,750	36,750
Software			0		20,000	20,000		21,000	21,000
Books & Journals			0			0			0
Other Supplies	16,987	60,289	77,276	35,843	90,000	125,843	37,635	94,500	132,135
Equipment			0		80,217	80,217		84,228	84,228
Maintenance		27,623	27,623		30,000	30,000		31,500	31,500
Scholarships		4,240	4,240		18,000	18,000		18,900	18,900
Consultants			0			0			0
Renovation			0			0			0
Other (Specify)			0			0			0
Pilot Projects			0		150,000	150,000		157,500	157,500
			0			0			0
			0			0			0
Total Non-Personnel	16,987	118,293	135,280	35,843	423,217	459,060	37,635	444,378	482,013
GRAND TOTAL	148,948	414,959	1,025,766	179,020	977,604	2,095,982	187,971	1,021,759	2,200,781
Revenue									
New State Appropriation		647,600	647,600		659,900	659,900		692,895	692,895
Carryover State Appropriation		85,063	85,063		317,704	317,704		328,864	328,864
New Matching Funds	148,948		148,948	179,020		179,020	187,971		187,971
Carryover from Previous Matching			0			0			0
Total Revenue	148,948	732,663	881,611	179,020	977,604	1,156,624	187,971	1,021,759	1,209,730

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 FY05 (the last year of NIH rankings available), the core department, Anatomy and Neurobiology, was ranked 23rd among all U.S. medical school departments of Anatomy and/or Cell Biology in NIH grant awards (21 awards totaling \$7,178,269 in direct costs, all for neuroscience research). Although not ranked with Departments of Neuroscience, the UTHSC Department of Anatomy and Neurobiology would be ranked *13th* in a listing of Neuroscience Departments, just behind the University of Florida. For FY 2006-2007, funding in Anatomy and Neurobiology was \$7,933, 717, direct costs (\$10.7 million Total costs) , the majority of which was from NIH. *The total annual grant dollars (direct costs) currently held by faculty (of all departments, including those at affiliates such as St. Jude and Univ. of Memphis) associated with the UTNI is \$ \$19,009,019. Given an investment by the State of Tennessee of ~\$13 million over the past 22 years, Neuroscience faculty have generated approximately \$243 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

Recognizing the importance of the multidisciplinary nature of the brain sciences, leaders at UTHSC created an interdisciplinary program in Neuroscience in 1985. The program currently brings together over ninety neuroscience faculty members holding appointments in 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 fostered through the program provide the cross-disciplinary environment necessary for high quality neuroscience research, training and patient care.

In recognition of this quality, the State of Tennessee established the Neuroscience Center of Excellence at UTHSC in 1985, which was designated as an Accomplished Center of Excellence by the Tennessee Higher Education Commission in 1988. In 1998, Chancellor William R. Rice designated the Neuroscience Center of Excellence as the University of Tennessee Neuroscience Institute, with dedicated space in the Wittenborg, Link and Johnson buildings. The Neuroscience Center of Excellence award provides funds to support graduate and postdoctoral education, to recruit and provide initial support to new neuroscience faculty, to renovate laboratory

facilities, to purchase research equipment, to host symposia, a weekly seminar series, and for community outreach programs such those associated with Brain Awareness Week. The Director from inception until June of 2002 was Dr. Steven T. Kitai.

In June of 2002, Dr. David V. Smith was recruited from the University of Maryland to serve as Chairman of the Department of Anatomy and Neurobiology and Director of UTNI. Dr. Smith appointed a new Executive Committee to help direct UTNI activities in 2002. In Dec. of 2005, Dr. Smith became ill with a brain tumor, and the Co-Director, Dr. William Armstrong, became acting Director. Dr. Armstrong has been Director of the Institute since Dr. Smith's death in September of 2006. Please see **Appendix 4** for Dr. Smith's obituary.

In spring of 2006 the Executive Committee was expanded to include clinician neuroscientists like Drs. Mark LeDoux and Jim Wheless, and additional basic science leaders on campus, such as Molecular Resource Center director Dan Goldowitz, and Professor of Physiology Charles Leffler. This year, Dr. Goldowitz announced his departure from UT effective Nov. of 2007; his replacement is Dr. Tony Reiner, a professor in Anatomy and Neurobiology. In 2006, the faculty-organized research groups assembled in 2002 have been expanded to include 3 new Translational Neuroscience Focus Groups (described below). The NI participates heavily in graduate education, providing student stipends for the Neuroscience Track of the Integrated Program in Biomedical Sciences, and contributing faculty to teach the Neuroscience block of the Systems Biology introductory course for that program. NI members serve as course instructors for 4 core Neuroscience Track graduate courses: Functional Neuroanatomy, Cellular Neuroscience, Developmental Neuroscience, and Behavioral Neuroscience. This fiscal year, three new faculty were added to the NI (see below).

V. FACULTY OF THE NEUROSCIENCE INSTITUTE

The Neuroscience Institute is currently comprised of 95 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. Faculty are listed with each department; those with primary appointments outside UTHSC or UTK are so indicated. Faculty shown in ***bold italics*** were recruited to the Institute in FY 2006-07.

Department of Anatomy and Neurobiology

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

John D. Boughter, Jr., Ph.D. Assistant 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)

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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.)

Robert C. Foehring, Ph.D., Professor

Daniel Goldowitz, Ph.D., Methodist Professor and Director of Molecular Resource Center

Kristin Hamre, Ph.D., Assistant Professor

Detlef Heck, 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

Christian H. Lemon, Ph.D., Assistant Professor

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

Lu Lu, Ph.D., Assistant Professor

Peter J. McKinnon, Ph.D., Affiliated Assistant 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

Thomas Schikorski, Ph.D., Assistant Professor

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

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

Douglas J. Swanson, Ph.D., Assistant Professor

Ryoichi Teruyama, Ph.D., Assistant Professor

Yiai Tong, Ph.D., Assistant 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 Assistant 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

Mary K. Dahmer, Ph.D., Associate Professor

Susan E. Senogles, Ph.D., Associate 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

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

Christopher Dunsch, M.D., Ph.D., Instructor

Silva Hannisian, Ph.D., Assistant Professor

James T. Robertson, M.D., Professor

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

Alan Sills, M.D., Associate Professor

Jeff Sorenson, M.D., Assistant Professor

Zixiu Xiang, Ph.D., Assistant Professor

Qihong Zhou, M.D., Ph.D., Instructor

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

Jena Steinle, Ph.D., Assistant Professor

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

Department of Pathology

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

Kenneth F. Manly, Ph.D., Professor

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

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

Dave Clark, M.D., Assistant Professor, Pediatric Neurology, Le Bonheur

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

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

Kafait U. Malik, Ph.D., Professor

Shannon G. Matta, Ph.D., Associate Professor
Burt Sharp, M.D., Van Vleet Professor and Chairman
Jeffery Steketee, Ph.D., Associate Professor
Steven J. Tavalin, Ph.D., Assistant Professor
Fu-Ming Zhou, M.D., Ph.D., Assistant Professor

Department of Physiology

Clark M. Blatteis, Ph.D., Professor
Ioannis Dragatsis, Ph.D., Assistant Professor
Jonathan Jaggar, Associate Professor
Charles W. Leffler, Ph.D., Professor
Mitchell A. Watsky, Ph.D., Associate Professor

Department of Psychiatry

Arthur M. Freeman, III, M.D., Professor
Ronald J. Bradley, Ph.D., Professor

Department of Surgery

Syamal Bhattacharya, Ph.D., Professor

University of Memphis

Ramin Homayouni, Ph.D., Assistant Professor
Doug Matthews, Ph.D., Associate Professor
Guy Mittleman, Ph.D., Professor

St. Jude Children's Hospital

Michael Dyer, Ph.D., Asst. Professor
Alessandra D'Azzo, Professor
Peter McKinnon, Ph.D., Assistant Professor
James Morgan, Ph.D., Professor
Guillermo Oliver, Ph.D., Assistant Professor

Richard Smeyne, Ph.D., Associate Professor

Stanislav Zakharenko, Ph.D., Assistant Professor

Jian Zuo, Ph.D., Assistant Professor

VI. AREAS OF NEUROSCIENCE RESEARCH

The research programs of the faculty of The Neuroscience Institute 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)	<i>Neurology</i>	R. Nelson	<i>Anatomy & Neurobiology</i>
A. Cantrell	<i>Anatomy & Neurobiology</i>	T. Nowak	<i>Neurology</i>
I. Dragatsis	<i>Physiology</i>	R. Pfeiffer	<i>Neurology</i>
E. Geisert	<i>Ophthalmology</i>	W. Pulsinelli	<i>Neurology</i>
D. Goldowitz	<i>Anatomy & Neurobiology</i>	A. Reiner	<i>Anatomy & Neurobiology</i>
R. Homayouni	<i>Neurology/U of Memphis</i>	L. Reiter	<i>Neurology</i>
M. Jacewicz	<i>Neurology</i>	R. Smeyne	<i>Anatomy & Neurobiology/St. Jude</i>
H. Kita	<i>Anatomy & Neurobiology</i>	R. Waters	<i>Anatomy & Neurobiology</i>
M. Levin	<i>Neurology</i>	J. Wheless	<i>Pediatric Neurology/Le Bonheur</i>

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)	<i>Neurosurgery</i>	A. Sills	<i>Neurosurgery</i>
F. Boop	<i>Neurosurgery</i>	J. Sorenson	<i>Neurosurgery</i>
C. Dunsch	<i>Neurosurgery</i>	Z. Xiang	<i>Neurosurgery</i>
Q. Zhou	<i>Neurosurgery</i>		

Excitable Properties of Neurons

Behavior, mental processes 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:

W. Armstrong (head)	<i>Anatomy & Neurobiology</i>	P. Herron	<i>Anatomy & Neurobiology</i>
J. Callaway	<i>Anatomy & Neurobiology</i>	R. Nelson	<i>Anatomy & Neurobiology</i>
A. Cantrell	<i>Anatomy & Neurobiology</i>	T. Schikorski	<i>Anatomy & Neurobiology</i>
A. Dopico	<i>Pharmacology</i>	R. Scroggs	<i>Anatomy & Neurobiology</i>
R. Foehring	<i>Anatomy & Neurobiology</i>	S. Tavalin	<i>Pharmacology</i>
M. Ennis	<i>Anatomy & Neurobiology</i>	R. Waters	<i>Anatomy & Neurobiology</i>
D. Heck	<i>Anatomy & Neurobiology</i>	R. Teruyama	<i>Anatomy & Neurobiology</i>
H. Kita	<i>Anatomy & Neurobiology</i>		
S. Zakharenko	<i>Anatomy & Neurobiology/St. Judes</i>		

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)	<i>Anatomy & Neurobiology</i>	R. Scroggs	<i>Anatomy & Neurobiology</i>
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J. Boughter	<i>Anatomy & Neurobiology</i>	R. Waters	<i>Anatomy & Neurobiology</i>
P. Herron	<i>Anatomy & Neurobiology</i>	Y.-H. Zhang	<i>Anatomy & Neurobiology</i>
E. Johnson	<i>Anatomy & Neurobiology</i>		
C. Lemon	<i>Anatomy & Neurobiology</i>		
C.-X. Li	<i>Anatomy & Neurobiology</i>		
R. Nelson	<i>Anatomy & Neurobiology</i>		

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)	<i>Ophthalmology</i>	D. Johnson	<i>Ophthalmology</i>
E. Chaum	<i>Ophthalmology</i>	M. LeDoux	<i>Neurology</i>
M. Dyer	<i>Anatomy & Neurobiology/St. Jude</i>	A. Reiner	<i>Anatomy & Neurobiology</i>
M. Fitzgerald	<i>Anat./ Neurobiology/Christian Bros.</i>	M. Watsky	<i>Physiology</i>
D. Goldowitz	<i>Anatomy & Neurobiology</i>	R. Williams	<i>Anatomy & Neurobiology</i>
A. Iannaccone	<i>Ophthalmology</i>	J. Zuo	<i>Anatomy & Neurobiology/St. Jude</i>
M. Jablonski	<i>Ophthalmology</i>		

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)	<i>Anatomy & Neurobiology/Pediatrics</i>	P. McKinnon	<i>Anatomy & Neurobiology/St. Jude</i>
J. Boughter	<i>Anatomy & Neurobiology</i>	G. Mittleman	<i>Anat./ Neurobiology/Univ. Memphis</i>
E. Chesler	<i>Oak Ridge National Labs</i>	G. Oliver	<i>Anatomy & Neurobiology/St. Jude</i>
A. d'Azzo	<i>Anatomy & Neurobiology/St. Jude</i>	M. Park	<i>Anatomy & Neurobiology</i>
I. Dragatsis	<i>Physiology</i>	A. Reiner	<i>Anatomy & Neurobiology</i>
A. Elberger	<i>Anatomy & Neurobiology</i>	L. Reiter	<i>Neurology</i>
D. Goldowitz	<i>Anatomy & Neurobiology</i>	B. Sharp	<i>Pharmacology</i>
K. Hamre	<i>Anatomy & Neurobiology</i>	R. Smeyne	<i>Anatomy & Neurobiology/St. Jude</i>
M. Honig	<i>Anatomy & Neurobiology</i>	D. Swanson	<i>Anatomy & Neurobiology</i>
R. Homanyouni	<i>University of Memphis</i>	Y. Tong	<i>Anatomy & Neurobiology</i>
L. Lu	<i>Anatomy & Neurobiology</i>	R. Waters	<i>Anatomy & Neurobiology</i>
J. Morgan	<i>Anatomy & Neurobiology/St. Jude</i>		

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)	<i>Pharmacology</i>	J. Steketee	<i>Pharmacology</i>
A. Dopico	<i>Pharmacology</i>	S. Tavalin	<i>Pharmacology</i>
A. Elberger	<i>Anatomy & Neurobiology</i>	F. Zhou	<i>Pharmacology</i>
S. Matta	<i>Pharmacology</i>		

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)	<i>Molecular Sciences</i>	M. LeDoux	<i>Neurology</i>
S. Bahouth	<i>Pharmacology</i>	K. Malik	<i>Pharmacology</i>
E. Chaum	<i>Ophthalmology</i>	J. Sorenson	<i>Neurosurgery</i>
M. Dahmer	<i>Molecular Sciences</i>	S. Tavalin	<i>Pharmacology</i>
C. Duntsch	<i>Neurosurgery</i>	R. Waters	<i>Anatomy & Neurobiology</i>

R. Foehring	<i>Anatomy & Neurobiology</i>	T. Yoo	<i>Medicine</i>
S. Hanissian	<i>Neurosurgery</i>	Q. Zhou	<i>Neurosurgery</i>
M. Jablonski	<i>Ophthalmology</i>	D. Johnson	<i>Ophthalmology</i>
J. Jagers	<i>Physiology</i>		

Translational Neuroscience

The NI will promote **Translational Neuroscience** endeavors in the coming years. Below is a description of three **Translational Focus Groups** and the outlines of their respective projects. Last year, we requested additional funds to advance this area. Although this request was denied, we will try and promote this work with our current budget where possible.

To maximize these efforts in the NI, three areas of emphasis have been identified: **Neurodegenerative Diseases, Developmental Neurobiology, and Drug Abuse (Brain, Mind and Behavior)**. These areas have been picked among others because of the existing core of NI scientists and, more importantly, because each problem has widespread visibility throughout Tennessee, demanding our attention and help.

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). Similarly,

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.

Translational Research Areas:

Support will focus on neurological disorders with expertise in the NI, and considered ripe for translational efforts. The primary effort of the NI will be on Parkinson's disease, Alzheimer'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 UT Dept. of Neurology. An Alzheimer's specialist has recently been hired into this department as well. In support of this clinical research, many basic scientists in the NI are studying the related brain areas, including neuroanatomists, neurophysiologists and neurogeneticists. Statewide, the Division of Neurology at the UT Knoxville Department of Medicine has faculty with Alzheimer's expertise, and this campus also has two strong basic scientists studying the disease. Translational research initially will focus on the genetic basis of disease and its susceptibility to treatment. Disease-associated DNA polymorphisms and their gene products will represent a strategic target for the group.

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

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

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

Translational Research Areas:

- Drug abuse and co-morbid disorders

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

This will require molecular expertise for the development of suitable genetic constructs and reliable, committed core expertise to generate, breed, validate and house recombinant mice. Adolescents are especially vulnerable to dependence on drugs of abuse, and this dependence is often a lifelong struggle. Therefore, initially, these studies will focus on adolescents in both human populations and animal models.

- Vulnerability to, and developmental effects of drug abuse

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

Focus 3: Brain Development (Leader, Dan Goldowitz, 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. The study of brain development is a major strength in the NI. Disorders with a strong clinical base (e.g., LeBonheur, Boling Center) include autism, learning disabilities, attention deficit disorders and epilepsy. Basic research ranges from genetic and molecular analysis of the early stages of central and peripheral nervous system development, to sophisticated functional assays of neuronal plasticity in response to environmental manipulations. We also anticipate considerable overlap with the Drug Abuse focus group as relates to brain development (see above). The group is highly collaborative and includes a significant contingent of neuroscientists from St. Jude Children's Research Hospital (primarily the Departments of Developmental Neurobiology and Genetics) and the University of Memphis. The genetics aspect in particular has received worldwide recognition in providing the Mouse Brain Library as well as other shared, web-based data sources. Last but not least, both clinicians and researchers in this area have strong ties to the Urban Child Institute to lead us out of the parochial realm of a medical school to be engaged and enriched by multidisciplinary approaches that focus on children aged 9 months to 3 years.

Translational Research Areas:

- Perinatal hypoxic ischemia

Hypoxic ischemia (HI) during perinatal life has a major, detrimental impact on the development of the nervous system, yet currently there is no effective neuroprotective therapy. Annually, it is estimated that neonatal stroke occurs in 4-5/1000 live births with an additional 20:1000 full-term births experiencing severe asphyxia. At least 25% of neonates suffering HI will develop some form of long-term debilitation, including mental retardation, a learning disability, epilepsy (also see below) and/or paralysis (NIH-NINDS)-this statistic may be an underestimate since the symptoms of HI may go unrecognized until later childhood. While there can be multiple causes of HI, prime among these and over represented in the Memphis area is preeclampsia (maternal hypertension). Whereas improved perinatal care has increased survival rates for both term and preterm infants suffering HI, and there are effective treatments (e.g., magnesium sulfate) to control the maternal seizures that result from preeclampsia, the decrease in infant mortality has not been correlated with improved neurological outcomes, further stressing the need of therapeutic intervention during pregnancy. Furthermore, some treatments for the mother's condition may have untoward effects on fetal nervous system development. Additional risk factors that could potentiate the ill effects of HI are various sorts of maternal drug abuse (e.g., cocaine, heroin, alcohol), and even cigarette smoking.

Neonatology and the Boling Center are currently developing an expanded follow-up program for high-risk neonates that will be critical to the systematic measurement of outcome in these children. The governor's and mayors' special initiatives on reducing high levels of infant mortality in Tennessee, Memphis especially, highlights the importance of these areas. Model systems are being developed at the research end that include hypoxia chamber and the mouse ligation model, female self administration of nicotine prior to pregnancy, and cell culture hypoxia, that are seen to be the preclinical tools for validation of interventions and testing of causation. Significant interaction between this effort and that of drug abuse (see above) would be expected.

- 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 characterized by abnormal social interactions, communication abilities, patterns of interests, and patterns of behavior. Whereas NIH lists frank autism prevalence at about 0.1%, according to the National Autism Association, 1 in 150 children have an ASD. To date, researchers have found several genes associated with ASDs. Fortunately for UT, the study of ASDs has a strong clinical component at the Boling Center and UT Pediatrics.

There is a core of basic scientists within the NI interested in ASDs, covering behavioral, genetic and neuronal developmental aspects of animal models. We have the potential to develop strong collaborations with the Univ. of Memphis and Vanderbilt University.

- Pediatric Epilepsy

Epilepsy is a relatively common disorder affecting ~1% of the U.S. populace (Epilepsy Foundation; Center for Disease Control). More striking is that some 10% of the population will suffer a seizure during their lifetime. Characterized by uncontrolled brain seizure activity, epilepsy can have with 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 2006 meeting of the Society for Neuroscience in Atlanta, GA 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. The Neuroscience Institute funds the stipends for students in the Neuroscience Track for the first two years of graduate training, after which they are funded by their mentors.

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, two graduate students and one postdoctoral fellow were supported by the NI; all the rest were supported by individual research grants to the NI faculty. Two graduate students previously supported by the NI were awarded the Ph.D., both within the Department of Anatomy and Neurobiology. This year the NI has taken a more active role in the national recruitment effort for the graduate program (see Goals below and **Appendix 4**).

IX. NEUROSCIENCE SEMINARS

During the 2006-07 academic year, the UTNI sponsored the weekly Neuroscience Seminar Series, hosting 28 seminars. Of these, 25 neuroscientists from outside and 4 within the NI presented their recent research findings to UT faculty and students. In addition, the NI sponsored three Translational Neuroscience Symposia, where clinical and basic neuroscientists presented their data on Autism, Parkinson's, and Drug Abuse. In these

symposia, we invited six internationally recognized scientists to speak with five NI members. serves as the basis for our graduate course, Neuroscience Seminar (ANAT 821), which is attended by all neuroscience graduate students and within which they read papers by and meet with the visiting scientists. This seminar program is vital to the Neuroscience 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. A complete list of FY 2006-07 seminar speakers and their topics is provided in **Appendix 3**. Also attached are the flyers for the Translational Neuroscience Symposia. The NI also supported a symposium during Brain Awareness Week, in collaboration with the Urban Child Insitute.

X. GOALS OF THE INSTITUTE AND RECENT ACCOMPLISHMENTS

Four long-range goals of the UT Neuroscience Institute were established in 1985. These were set to promote excellence in Neuroscience research, education and patient care and to facilitate public awareness of Neuroscience efforts at UT, and are still current.

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.
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.
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.
4. ***Interact with the faculty of other UT campuses and neighboring undergraduate institutions*** and Tennesseans to convey to and through them the current understanding of brain function.

During the 2006-07 academic year, the UTNI has moved forward with accomplishments toward all of these goals, as delineated below:

Goal 1: Augment our already strong research efforts in Neuroscience.

Faculty recruitment. During the past academic year, four new faculty members became affiliated with the UTNI: Jena Steinle, Ph.D. (Ophthalmology), Dave Clark, M.D., Amy McGregor, M.D., and Freedom F. Perkins, Jr., M.D., (Pediatric Neurology, Le Bonheur), Collin Hovinga, Pharm.D. (Pharmacy).

Renovation of facilities. Renovations of Neuroscience space were largely completed in 2002, with the completion of level 3 Wittenborg building. The Institute primarily occupies ~64,000 sq. ft of modern lab and office space in the adjacent Wittenborg (all floors), Link (two floors) and Johnson (1 floor) buildings, which house the Anatomy and Neurobiology, Neurology, and Neurosurgery departments. Additional NI faculty occupy substantial laboratory space within their respective departments. Of particular note are several members of the NI in the Pharmacology department, housed in the Crowe building on the same quad as the three aforementioned buildings.

Acquisition of equipment. During the past year, the UTNI expended \$98,193 in startup funds for faculty recruited in 2002-2003, which went for primarily supplies and equipment in their laboratories. An additional \$311,608 in matching funds came from the College of Medicine. Most research equipment for Neuroscience research has been purchased through extramural grants (totaling \$243 million over the past 20 years) to the NI faculty. In the past, the NI has also contributed matching funds for multi-user equipment grants, including those obtained from NIH for an electron microscope, for a confocal microscope, for a computerized light microscope for three-dimensional neuronal reconstructions, and most recently for a high resolution digital camera attachment for the electron microscope. These items are located in the Neuroscience Imaging Core and are maintained and supervised by a dedicated Technical Director provided by the NI. Maintenance of these items (e.g., service contracts) is largely paid through use fees, but the NI has contributed. The NI would like to expand the imaging core to include a state-of-the-art 2-photon confocal microscope (see Future Goals).

Developing major programmatic activities. Several areas of research focus exist within the UTNI 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 and the NI are detailed in Future Goals below. These areas have been picked among others because of the existing core of NI scientists and, more importantly, because each problem has widespread visibility throughout Tennessee, demanding our attention and help.

Several faculty of the UTNI are involved in large scale, programmatic grants. Examples are the Integrative Neuroscience Initiative on Alcoholism (INIA) consortia from the National Institute on Alcohol Abuse (NIAA) and Alcoholism to NI members Dan Goldowitz, Rob Williams at UTHSC, and Doug Matthews, and Guy Mittleman (NI members from University of Memphis). Other programmatic funding stems from a Vision Core grant to Dianna Johnson from the National Eye Institute, and the Neurohistological Core grant to Dr. Elberger from NIAA. The NIAA grants in particular have focused much NI activity on the study of alcohol's effects on gene mutation and on the developing nervous system.

UTNI projects that may be of particular value to **Tennessee industry, government or culture** are:

- Basic science projects address the underlying causes of the devastating neurodegenerative disorders, Alzheimer's disease, Huntington's disease, and Parkinson's disease. A significant fraction of the Tennessee population will be affected by these disorders, either as a victim or a caregiver. Any progress made toward understanding the mechanisms of these diseases or developing therapeutic options will have a positive impact on the citizenry through increasing health and longevity and decreasing the economic burdens imposed by these disorders.
- Basic science research on fetal alcohol effects on brain development. There is a relatively high incidence of prenatal effects from substance abuse among the Tennessee population. Projects also address the interaction of alcoholism, stress and genetics to determine if there are preventable combinations. Absences, injury and lack of productivity due to substance abuse in adults is a significant problem in Tennessee.
- Ongoing efforts to develop drugs to treat brain cancers, especially glioblastomas.
- Investigation of the cellular mechanisms of adult brain tumors, especially glioblastomas, in an effort to understand and control cell proliferation in patients with these tumors.
- Research to determine whether remediation of functions (such as basic forms of learning and memory) can be obtained with endogenous trophic proteins in a rat model that mimics some aspect of Alzheimer's disease.
- Research on the basis of neurodegenerative diseases of the eye and brain, which helps to provide insight into therapies to combat such diseases. The goal is to learn how to keep eyes and brains healthier for longer in Tennesseans and all other people.
- Ongoing research on the behavioral biology of addiction, including nicotine and alcohol addiction, depression, and stress.

- The UTNI faculty participate heavily in a number of educational programs for minority students, as delineated below.

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 one thousand 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 33 seminars: 28 by visiting neuroscientists and 5 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.utmem.edu/neuroscience>, is currently being expanded and will soon include the services offered by the Neuroscience Imaging Core, and the efforts behind our Translational Neuroscience Research initiatives. The other server 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 <http://www.nervenet.org/main/databases.html> 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

In conjunction with the *NIH Medical Student Research Fellowship Program* in the College of Medicine, Neuroscience faculty offered summer laboratory experiences to the following medical students:

**University of Tennessee College of Medicine
NIH Medical Student Research Fellowship Program
2007 Summer Research Fellows**

<u>Student</u>	<u>NI Preceptor, Department</u>	<u>Project Title</u>
Campbell, Douglas L.	Pfeffer, Lawrence M., Ph.D. Professor, Pathology	NF-kB inhibitor velcade potentiates the anti-tumor action of interferon on neuroblastoma cells
Joyce, Emily	Leffler, Charles W., Ph.D.	Contribution of astrocytes to autoregulatory cerebral

	Professor, Physiology	vasodilation in newborns
Frederick, Katherine	Bahouth, Suleiman, Ph.D. Associate Professor, Pharmacology	Characterization of the role of rab11 in the recycling of the human B ₁ –adrenergic receptor
French, Joshua B.	Bhattacharya, Syamal, Ph.D. Professor, Surgery	Role of N-acetylcysteine in the recovery of heart and skeletal muscle wasting due to the oxidative stress associated with aldosteronism in rats
McNeely, David E. III	Chaum, Edward, M.D., Ph.D. Professor, Ophthalmology	A novel microfabricated, disposable instrument to treat recurrent corneal erosions and deliver drugs to the cornea
Saini, Vikram	Chaum, Edward, M.D., Ph.D. Professor, Ophthalmology	The use of content base image retrieval in the diagnosis of retina disease
Payne, Bryan K.	Dyer, Michael A., Ph.D. Associate Member, Infectious Diseases St. Jude Children’s Hospital	Targeted chemotherapy in pre-clinical mouse models of retinoblastoma

Several **Minority Training Programs** continue to be active and supported by UTNI neuroscientists and their laboratories. These programs are administered at UTHSC largely by Dr. E. J. Johnson, a member of the Anatomy and Neurobiology Department and the UTNI, and provide financial support to the recruitment of minority students. The **Prescience Program** is a “hands on” and “learn by doing” basic science career exposure (research laboratory apprentice-preceptorship) and basic science skills reinforcement activity for scholarly oriented high school and college minority students. More specifically, this regimen pairs 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. This program is funded by the State of Tennessee. The Southwest Tennessee Community College (SWTCC) **Bridge Program** identifies eligible SWTCC students very early in their academic careers and places them in a mentoring program that provides advice, guidance and science instruction throughout the academic year. Students are introduced to research experiences by placing them for the summer in a research laboratory at UTHSC, where they participate in ongoing research. The NIH funds this program. The **Minority Biomedical Research Science Program** (MBRS) is designed to educate and expose under-represented minority students and junior level science faculty of Lemoyne-Owen and Rust Colleges to aspire to Ph.D.-level careers in neuroscience by active participation in ongoing research in the basic sciences and clinical laboratories at UTHSC. The NIH

funds the MBRS program. A final minority program is the **Short-Term Training Program for Minority Students**, funded by the NIH. The goal of this effort is to provide undergraduate minority students with experience in cardiovascular functional research in order to encourage them to seek careers in basic and clinical biomedical research.

This year also marks the second year for awarding **Undergraduate Neuroscience Scholarships** to outstanding undergraduates at Rhodes College and Christian Brothers University. These scholars are picked by the respective institutions for their interest in Neuroscience and their academic performance, and placed in NI labs at UTHSC for two summers. The scholars work on independent projects for their undergraduate thesis. One of last year's two seminal scholars, Teresa Bell of Rhodes College, continued here work with Dr. Matt Ennis. The new scholars for 2007 are Indire Augustinaite from Christian Brothers University (Matt Ennis sponsor) and Joel Chatham from Rhodes College (Shannon Matta sponsor). See **Appendix 4** for report from UTHSC Record.

This past year the Neuroscience Institute also supported direct recruitment of graduate students into the Interdisciplinary Program for Biomedical Sciences by creating and circulating a flyer to 200 different undergraduate biology, psychology, and neuroscience programs nationwide. A copy of the flyer can be found in **Appendix 4**.

The NI will continue to support the education of child-care workers and teachers. This past year, NI member Dr. Paul Herron developed a course in Brain Development in collaboration with Linda Kennard, Ph.D., the Director of Early Childhood Education for Memphis City Schools. NI funding contributed books and models to be used in the course. This course took place at the Urban Child Institute.

Goal 3: Hasten the application of the latest and most promising scientific information to the clinical treatment of neurological diseases

To date, this goal has been served largely by the Neuroscience Seminar series, conferences and workshop participation by the faculty, and collaborative research activities, especially those between basic scientists and clinical faculty. Several of the research focus areas of the UTNI 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. As stated above (also see Future Directions), this aim was further addressed this year by the formation of three **Translational Neuroscience Focus** areas. This year we held three **Translational Neuroscience Symposia** (See **Appendix 4** for flyers). These symposia featured clinical and basic scientists, and attempted to elucidate how interaction between clinicians and basic research scientists can facilitate treatment of neurological disease in the areas of autism, Parkinson's Disease, and Drug Addiction. In addition, the NI is determined to further Translational Neuroscience at UTHCS by providing start-up funds for newly recruited faculty studying human neurological disease, by helping to equip

the Neuroscience Imaging Core with cutting edge neurobiological imaging tools, and by sponsoring pilot translational work. We expect to work closely with the Clinical Translational Science Center.

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

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. Current collaborative projects include INIA consortia sponsored by NIAA (see above).

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 newly installed Translational Neuroscience Symposia will bring together clinical and basic research scientists from our various local sites and outside speakers.

The UTNI continue their 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 **“ADD and ADHD: Advances in Understanding and Treatment”**, 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 Dr. William E. Armstrong, Director of the UTNI. Two talks on attention deficit disorders (ADDs) and attention deficit hyperactivity disorders (ADHDs) were featured. Dr. David Kube (Department of Developmental Pediatrics, UTHSC), spoke on the updated diagnosis and management of these disorders. Dr. Margaret Semrud-Clikeman, Michigan State University, spoke on recent advances from brain imaging on the neurological basis for these disorders. Over 200 parents and healthcare professionals attended this event, which generated considerable discussion among the participants. Photos, a press release to Commercial Appeal, and the flyer on this Brain Awareness Week event are provided in **Appendix 4**.

APPENDIX 1
External Funding of Neuroscience Institute Faculty
FY 2006-07

<i>P.I.</i>	<i>Project Name</i>	<i>Agency</i>	<i>Project Period</i>	<i>Direct Costs FY 2006-2007</i>
Armstrong, W. E.	Plasticity of oxytocin neurons during lactation HD 41002 No Cost Extension	NIH	06/30/01 07/30/07	\$172,701
	Electrophysiological correlates of vasopressin NS 23941	NIH	12/01/05 11/30/09	\$196,628
	Central control of oxytocin release during gestation HD038241	NIH/Univ. Utah	12/1/2004 5/31/07	\$16,122
Bahouth, S.	Role of PdZ-targeted PKA in recycling and resensitization of the human 1-adrenergic receptor	AHA	07/01/06 06/30/07	\$41,281
Blatteis, C.	Pathophysiology endotoxinmediated fever NS34857 No cost extension	NIH	04/01/00 03/31/07	\$175,000
	Pge2 and fever: insight from transgenic mice models NS38594	NIH	7/25/00 10/31/07	\$250,000
Boughter, J	Sensory coding in taste DC000353	NIH	09/01/85 07/31/09	\$244,251
	Genetic Dissection of a Motor Central Pattern Generator NS 052366	NIH	01/15/07 12/31/07	\$87,500
Callaway, J.	Dendritic role in dopamine neuron firing NS42276 No Cost Extension	NIH	03/01/02 02/28/08	\$166,250
Cantrell, A.	Ion channel dysfunction in Huntington's disease R01NS46885	NIH	09/01/03 08/31/08	\$200,000
Chaum, E.	Electrochemical Quantification of Strum Propofol Levels for Target Controlled Infusion Anesthesia, W81XWH-05-2-0064	US Army	09/07/06- 08/31/07	\$92,459

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	Molecular Responses to Oxidative Stress in the Retinal Pigment Epithelium Validation of Antioxidant Effects on RPE Gene Expression	Proprietary Study	12/01/00-08/28/07	\$222,624
	Automated screening for Diabetic Retinopathy by Content	NIH/NEI (ORNL)	9/1/2005 08/31/08	\$589,030
	A study of the resolution intraocular bleeding in infants and toddlers with Shaken Impact Syndrome	Fight for Sight	09/21/04 12/30/06	\$15,000
D'Azzo, A.	Specificity and Activity of Ozz-E3 During Myogenesis	NIH	5/2/2004 5/30/2009	\$176,000
Dopico, A.	Ethanol actions on SLO channels from arteries vs. brain AA1156-04	NIH	01/01/99 03/31/09	\$176,331
	Nongenomic bile acid on smooth muscle BK channels HL077424	NIH	05/01/04 04/30/08	\$101,498
Dragatsis, I.	Establishment of conditions for extended survival & evaluation of therapeutic effects of Tocotrienols in a mouse model	The Dysautonomi Foundation	7/1/2007 12/31/07	\$78,261
Dyer, M.	Proliferation control in the retina: the Rb family EY014867	NIH	9/30/03 6/30/08	\$337,500
	Targeted Chemotherapy for Retinoblastoma	Intl Retinal Res. Found.	7/01/06 6/30/07	\$95,238
	Identification of the Retinoblastoma Cell or Origin	RSG-06-030-01-DDCACS	01/01/06 12/31/09	\$150,000
	Mouse Models of Retinoblastoma	NIH	07/01/04 06/30/08	\$50,000
	Identifying Rb targets in the developing retina	PEW Scholar Program	08/18/02 07/31/07	\$55,556
	Evolution/Development of Primate Retinal Organization 0131370	NSF		\$17,122
	Proliferation Control in the Retina: The Rb Family 5R01EY014867-04	NEI	09/30/03 06/30/08	\$271,000

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	Retinoblastoma and the Rb Family 5P30CA021765-29	NCI	06/20/02 02/28/07	\$40,221
Ennis, Matthew	Metabotropic glutamate receptors in the olfactory bulb DC 3195	NIH	7/1/2003 12/31/2007	\$212,500
	CRNS Computational and Experimental Analysis of Noradrenergic Function in Early Sensory DC 008702	NIH/Cornell	7/1/2006 06/30/07	\$86,340
Fitzgerald, M.	Mid-South coalition for minority health international research training	NIH Fogerty Intl	09/01/00 06/30/09	\$200,000
Foehring, R.	Slowly inactivating K ⁺ channels in pyramidal neurons NS044163 No Cost Extension	NIH	03/01/03 02/28/08	\$237,500
Geisert, E.	Vision Center Research Center	Private Donor	01/15/03 01/14/08	\$60,000
	Community Foundation Eye Tumor Research Fund	UTHSC	03/14/03 03/13/08	\$325,000
Goldowitz, D.	Gene to Phenotype Networks for Alcohol & Drug Addiction	NIH	09/30/06 06/30/07	\$614,365
	INIA: Mouse Resources Core	NIH	03/01/07 01/31/08	\$215,878
	Mapping Cerebellar Development in Time and Space	NIH	09/05/06 06/30/10	\$568,793
	Role of Dab2IP in Brain Development	UM/NIH	6/1/06 5/31/09	\$84,643
	Pleiades Promoter Project	UBC	1/1/06 12/31/09	\$87,524
	Role of the HD Protein in Neuronal Survival in Adults	High Q Foundation	8/01/06 7/31/07	\$115,652
Grosveld, A.	Lysosomal Storage Disease	P & E Gross	04/01/00- 03/31/07	\$70,136
	Specificity and activity of Ozz-E-3 During Myogenesis	NIAMS	05/02/04- 04/30/09	\$70,136

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	Functional/structural Studies of Mammalian Neuraminidase	NIGMS	04/01/06-03/31/10	\$235,000
	Lysosomal Diseases	NIDDK	07/01/02-05/31/07	
	Lysosomal Storage Disorders	ASSISI FDN. Memphis	11/01/05 10/31/06	\$95,262
Honig, M.	Sensory axon path-finding NS34404	NIH	07/01/95 06/30/11	\$200,000
Iannaccone, A.	Infracstructural Support for CNTF Trials NNR GR NN-NG-CK-0407-0015-NP	NNRI	04/01/07 12/31/08	\$25,000
	Career Development Award	RPB	01/01/03 12/31/07	\$50,000
	Epidemiology of Carotenoids Inflammation and Genetic Markers in Age-Related Macular Degeneration	IRRF	1/1/2004 12/31/07	\$153,346
	Age Related Eye Disease Study II (AREDS) Contract HHS-N-260-2005-0007-C	EMMES Corp	01/01/06 12/31/06	\$121,326
Jablonski, M	Glycans Promote Retinal Development-Identifying Receptor and Effector Cell Type	Mizutani Fund	04/01/06 03/31/08	\$30,909
	Proteomic Analysis of Xenopus laevis Retina	NIH/NEI	05/01/05-04/30/08	\$197,650
	Submacular Vasoactive Neural Networks in Aging and Age-Related Macular Degeneration	Macular Degeneration Res. Foundation	05/22/00 05/21/10	\$27,850
Jaggar, J.	Mitochondrial regulation of calcium signaling	NIH	03/11/05 02/28/09	\$219,713
	Calcium signaling in cerebral arteries	NIH	04/01/02 03/31/07	\$191,286
Johnson, D.	Core Grant for Vision Research P30 EY13080	NIH	03/10/00 03/31/10	\$252,368
Kita, H.	Physiology and anatomy of the basal ganglia NSO4276 No Cost Extension	NIH	12/1/2001 11/30/06	\$166,250
	Rhythmicity and Synchrony in the Basal Ganglia	NIH/North-western Univ	9/1/2003 08/31/08	\$160,000

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LeDoux, M.	Mutant Gene Identification in the Dystonic Rat NS 48458	NIH	02/01/05 1/31/09	\$139,750
	Tetrahydroisoquinolines and Parkinson's Disease NS 49123	NIH	04/01/05 03/31/08	\$50,000
	Molecular foundations of the Myoclonus-Dystonia Syndrome NS 50185	NIH	06/15/05 05/31/08	\$50,000
Leffler, C.	Studies of control of neonatal circulation HL034059	NIH	04/01/85 03/31/08	\$244,125
	Carbon monoxide in newborn cerebral circulation HL042851	NIH	08/16/91 07/31/10	\$250,000
Lemon, C.	Gustatory neural coding in mice: connecting taste Receptors to the brain 1R03DC008194-01	NIH	04/01/06 03/31/09	\$50,000
Lu Lu	Genetic analysis of ethanol-mediated stress reduction	NIH	6/1/2004 05/31/08	\$319,484
Malik, K.	Angiotensin-prostaglandins adrenergic interactions HL019134	NIH	09/01/77 08/30/07	\$232,313
	Lipid/lipoprotein metabolism and cardiovascular disease HL007641	NIH	07/01/88 06/30/08	\$278,801
	Eicosanoids-induced Vascular Growth During Injury HL079109	NIH	1/1/2005 12/31/09	\$255,054
Manly, K.	Portable Software for Mapping Quantitative Traits	NIH	09/01/97 08/31/07	\$136,044
	Integrative Genetics of Cancer Susceptibility CA105417	NIH/Univ. No. Carolina	08/15/04 03/31/08	\$82,247
Matta, S.	Gestational drugs and nicotine self-administration DA015525	NIH	04/01/03 03/31/08	\$157,697
Matthews, D.	INIA: System mechanisms in stress-alcohol interactions U01 AA013509	NIH	02/01/02 01/31/08	\$231,315
	GABA _A receptor g[2] knockout: ethanol and spatial memory AA14588	NIH	9/20/2004 08/31/08	\$90,803

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McKinnon, P.	ATM and cell death in the nervous system NS037956	NIH	08/01/02 07/31/07	\$237,500
	Genome instability in mouse medulloblastoma 5 PO1CA09832-04	NIH	04/01/03 03/31/08	\$240,000
Miller, D.	Irreversible nonsteroidal SARMS for prostate cancer	NIH	7/1/2002 6/30/2006	\$192,925
Morgan, J.	Characterizing novel adult neuronal survival factors 5R01NS042828-02	NIH	12/10/04 11/30/09	\$225,816
	Nil-16: A link between ION channels and cytokines NS040749	NIH	02/15/02 01/31/06	\$142,500
	Mechanisms of Cell Death in the Nervous System	NINDS	5/1/2001 04/30/06	\$200,000
Nelson, R.	Modulation of primate somatosensory cortical responses NS36860	NIH	04/01/07 03/31/12	\$196,875
Oliver, G.	Prox 1 in mammalian lymphangiogenesis HL073402	NIH	05/01/03 04/30/12	\$244,125
	The Role of Homeobox Six3 in Holoprosencephaly-cyclopia R01NS052386-01A1	NINDS	04/04/06- 03/31/10	\$272,475
Reiner, A.	Neuropathology and pathogenesis of Huntington's disease NS028721 No Cost Extension	NIH	04/01/00 03/31/06	\$225,000
	Neural control of choroidal blood flow in the eye EY005298	NIH	12/01/96 11/30/07	\$250,000

	Behavioral and Histological Assessment in R6/2 Mice of The Efficacy of The Group 2 Metabotropic Glutamate Receptor Agonist Ly379268 for Treating Huntington's Disease	High Q Foundation	01/01/07 12/31/07	\$150,000
	Role of Striatal Parvaluminergic Neurons in Dystonia in Huntington's Disease	HDF	06/01/07 05/31/08	\$50,000
Senogles, S.	D2 Dopamine Receptor Activation Leads to Anti-Proliferation in a Small Cell Lung Cancer Cell Model	NIH	06/01/07- 05/31/08	\$173,074
	Opiate receptor mediated effects of stress on immunity DA004196	NIH	09/30/86 06/30/09	\$297,002
Smeyne, R.	Genetics of MPTP-induced Parkinsonism NS39006	NIH	07/01/04 06/30/09	\$236,000
Steketee, J.	Toluene as a gateway drug: Role of dopamine systems DA015965	NIH	09/30/02 02/28/07	\$143,735
Tavalin, S.J.	Regulation of Ionotropic Glutamate Receptors	NIH	05/15/05 05/31/09	\$148,858
Waters, R.	Fetal alcohol exposure and sensori- motor cortex function AA013437 No cost extension	NIH	08/01/03 07/31/07	\$200,000
	Brainstem gustatory processing DC000066	NIH	04/01/90 06/30/08	\$215,711
	Mechanisms of Large-scale Reorganization in Rat Forepaw Barrel Subfields	NIH	5/01/07 4/30/11	\$175,000
Watky, M.	Development of an artificial innervated cornea for safety and efficacy testing	Univ. of Ottawa	05/01/07 07/01/10	\$103,988
Williams, R.	Human brain project: Informatics center for mouse neurogenetics P20-MH 62009 and IBN-0003982	NIH	07/01/00 08/31/09	\$1,051,488

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	Striatal and Neocortical Transcriptiomes	High Q Foundation	01/01/06 12/31/07	\$385,972
	INIA: Robust Systems Genetics of Alcohol and Stress Effects on CNS	NIH	02/01/07 12/31/07	\$316,888
	Integrative genetics of cancer susceptibility CA 105417	UNC/NIH	8/15/04 03/31/08	\$82,247
	Mouse BIRN 442171760	NIH/UCLA	04/01/05 03/31/08	\$199,912
	Dispersing Pattern for Retinal Neuroblasts R01EY01087	NIH/UCSB	09/01/04 03/31/07	\$32,243
Yoo, T.	Immune responses in tubulin induced hearing loss in mice DC005010	NIH	07/01/03 06/30/08	\$198,107
Zhou, F.	Voltammetric analysis of striatal dopamine dynamics MH067119	NIH	03/03/04 01/31/07	\$152,553
Zuo, J.	Mouse Genetics of Retinitis Pigmentosa 5R01EY012950-04	NIH	2/1/2001 01/31/08	\$175,000
	Genetic Analysis of Mammalian Hearing Sensitivity DC006471-03	NIH	01/01/04 12/31/08	\$234,392
Total	<hr/>			\$19,009,019

APPENDIX 2
Faculty Publications and Society for Neuroscience Presentations
FY 2006-07

1) Peer-reviewed publications for 2006-07 (cited in PubMed):

- Adebiyi, A, Zhao, G, Cheranov, SY, Ahmed, A, and **Jaggar, JH**. Caveolin-1 abolishment attenuates the myogenic response in murine cerebral arteries. *Am J Physiol Heart Circ Physiol* 292: H1584-1592, 2007.
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- Armstrong, WE**, and Hatton, GI. The puzzle of pulsatile oxytocin secretion during lactation: some new pieces. *Am J Physiol Regul Integr Comp Physiol* 291: R26-28, 2006.
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- Bao, D, Pang, Z, Morgan, MA, Parris, J, Rong, Y, Li, L, and **Morgan, JI**. Cbln1 is essential for interaction-dependent secretion of Cbln3. *Mol Cell Biol* 26: 9327-9337, 2006.
- Bao, L, Peirce, JL, Zhou, M, Li, H, **Goldowitz, D, Williams, RW, Lu, L**, and Cui, Y. An integrative genomics strategy for systematic characterization of genetic loci modulating phenotypes. *Hum Mol Genet* 16: 1381-1390, 2007.
- Bao, L, Wei, L, Peirce, JL, **Homayouni, R**, Li, H, Zhou, M, Chen, H, **Lu, L, Williams, RW**, Pfeffer, LM, **Goldowitz, D**, and Cui, Y. Combining gene expression QTL mapping and phenotypic spectrum analysis to uncover gene regulatory relationships. *Mamm Genome* 17: 575-583, 2006.
- Bao, L, Zhou, M, Wu, L, **Lu, L, Goldowitz, D, Williams, RW**, and Cui, Y. PolymiRTS Database: linking polymorphisms in microRNA target sites with complex traits. *Nucleic Acids Res* 35: D51-54, 2007.
- Baranova, O, Miranda, LF, Pichiule, P, **Dragatsis, I**, Johnson, RS, and Chavez, JC. Neuron-specific inactivation of the hypoxia inducible factor 1 alpha increases brain injury in a mouse model of transient focal cerebral ischemia. *J Neurosci* 27: 6320-6332, 2007.
- Barr, RS, Culhane, MA, Jubelt, LE, Mufti, RS, **Dyer, MA**, Weiss, AP, Deckersbach, T, Kelly, JF, Freudenreich, O, Goff, DC, and Evins, AE. The Effects of Transdermal Nicotine on Cognition in Nonsmokers with Schizophrenia and Nonpsychiatric Controls. *Neuropsychopharmacology*, 2007.
- Basuroy, S, **Bhattacharya, S**, Tcheranova, D, Qu, Y, Regan, RF, **Leffler, CW**, and Parfenova, H. HO-2 provides endogenous protection against oxidative stress and apoptosis caused by TNF-alpha in cerebral vascular endothelial cells. *Am J Physiol Cell Physiol* 291: C897-908, 2006.
- Beranova-Giorgianni, S, Zhao, Y, **Desiderio, DM**, and Giorgianni, F. Phosphoproteomic analysis of the human pituitary. *Pituitary* 9: 109-120, 2006.
- Besson, A, Hwang, HC, Cicero, S, Donovan, SL, Gurian-West, M, Johnson, D, Clurman, BE, **Dyer, MA**, and Roberts, JM. Discovery of an oncogenic activity in p27Kip1 that causes stem cell expansion and a multiple tumor phenotype. *Genes Dev* 21: 1731-1746, 2007.
- Blagov, PS, **Bradley, R**, and Westen, D. Under the axis II radar: clinically relevant personality constellations that escape DSM-IV diagnosis. *J Nerv Ment Dis* 195: 477-483, 2007.

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- Boop, FA,** Medhkour, A, Honeycutt, J, James, C, Cherny, WB, and **Duntsch, C.** In vitro testing of current spread during ventricular catheter coagulation using diathermy. Technical note. *J Neurosurg* 106: 165-168, 2007.
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- Bukiya, AN, Liu, J, Toro, L, and **Dopico, AM.** Beta1 (KCNMB1) subunits mediate lithocholate activation of large-conductance Ca²⁺-activated K⁺ channels and dilation in small, resistance-size arteries. *Mol Pharmacol* 72: 359-369, 2007.
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Brooks, IM, and **Tavalin, SJ**. The prototypical CaMKII inhibitor KN-62 alters calmodulin and PKC interactions with AKAP79. *Neuroscience Abstract*, 2006.

Heck, DH, Boughter, J, and Bryant, J. Inverted neuronal code in the cerebellum: pauses in Purkinje cell activity are correlated with rhythmic movements. *Neuroscience Abstract*, 2006.

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Zhao, L, and **Nowak, TS, Jr**. Cortical lesions that suppress resting cerebral blood flow and metabolism are required for robust neuroprotection by focal ischemic preconditioning in the spontaneously hypertensive rat. *Neuroscience Abstract*, 2006.

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Swanson, DJ, and **Goldowitz, D**. Experimental chimeras reveal a spatial heterogeneity in developmental potential of Pax6-null cerebellar granule cells. *Neuroscience Abstract*, 2006.

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Bryan, JL, **Boughter, JD**, and **Heck, DH**. Strong representation of rhythmic licking movements in the cerebellar cortex: an electrophysiological study in awake behaving mice. *Neuroscience Abstract*, 2006.

Blaha, CD, **Boughter, J**, **Heck, D**, **Goldowitz, D**, Martin, LA, and **Mittleman, G**. Developmental cerebellar pathology: influences on stereotyped behavior and frontal cortex dopamine release. *Neuroscience Abstract*, 2006.

Gerecke, KM, Jiao, Y, and **Smeyne, RJ**. The effects of variable exercise schedules on neuroprotection in the MPTP model of Parkinson's disease. *Neuroscience Abstract*, 2006.

APPENDIX 3
Neuroscience Seminar Speakers
FY 2006-07



FALL 2006 NEUROSCIENCE SEMINAR SERIES

12:00 Noon

Link Auditorium

Detlef H. Heck, Ph.D.

August 22, 2006

Assistant Professor

Department of Anatomy & Neurobiology

UTHSC

TITLE: "Structure and Function of the Cerebellar Cortex: Conducting the Neuronal Symphony"

Ronald L. Davis, Ph.D.

August 29, 2006

R.P. Doherty-Welch Chair in Science

Department of Molecular & Cellular Biology

Department of Psychiatry & Behavioral Sciences

Baylor College of Medicine

Houston, TX

TITLE: "Watching Memories Form: Multiple Olfactory Memory Traces in Drosophila"

Labor Day Holiday

September 5, 2006

Gary Aston-Jones, Ph.D.

September 12, 2006

Professor of Neuroscience

Medical University of South Carolina

Charleston, SC

TITLE: "The Cortex in Context: Locus Coeruleus, Optimal Performance, and Maximal Utility"

Paul B. Manis, Ph.D.

September 19, 2006

Cell & Molecular Physiology

The University of North Carolina @ Chapel Hill

Chapel Hill, NC

TITLE: "Spike Timing and an Inhibitory Neural Network in the Dorsal Cochlear Nucleus: Mechanisms for Tinnitus?"

Wen Lin Sun, Ph.D.

September 26, 2006

Associate Professor

Department of Pharmacology

UTHSC

TITLE: **“Neurobiology of Cocaine Addiction”**

Robert Grainger

October 3, 2006

University of Virginia

Department of Biology, Gilmer Hall

Charlottesville, VA

TITLE: **“Xenopus Tropicalis: A New Model for Vertebrate Developmental Genetics”**

Mike Friedlander, Ph.D.

October 10, 2006

Wilhelmina Robertson Professor & Chair

Department of Neuroscience & Director of Neuroscience Initiatives

Baylor College of Medicine

Houston, TX

TITLE: **“Dynamic Modulation of Signaling in the Visual Cortex”**

Neuroscience Annual Meeting

October 17, 2006

David Freeman, Ph.D.

October 24, 2006

Assistant Professor

Department of Biology

University of Memphis

TITLE: **“Neuroendocrine Regulation of Seasonality in Siberian Hamsters”**

James Morgan, Ph.D.

October 31, 2006

Professor and Chair

Department of Developmental Neurobiology

St. Jude Children’s Research Hospital

TITLE: **“Characterizing the Cbln1 Signaling Pathway and Its Role in Synapse Structure and Function in the Cerebellum”**

Paul D. Shepard, Ph.D.

November 7, 2006

Associate Professor

Department of Psychiatry & the Maryland Psychiatric Research Center

School of Medicine

TITLE: **“And the Beat Goes On – or Does It? Autogenous Rhythmicity and its Relevance to Dopamine Cell Firing Patterns”**

Dr. Wendy Stone

November 17, 2006

Vanderbilt University

Nashville, TN

TITLE: **“Early Identification of Autism: Challenges and Strategies”**

Dr. Pat Levitt

Vanderbilt University

Nashville, TN

TITLE: “Translational Research Strategies Applied to Autism”

Kendal S. Broadie
Department of Biological Sciences
Vanderbilt University
Nashville, TN

November 21, 2006

TITLE: “Two Tales of Synaptogenesis: ECM-Integrin Signaling and Translation Regulation by the Fragile X Mental Retardation Protein”

Ian Whishaw, F.R.S.C.
Board of Governors Research Chair
Canadian Centre for Behavioural Neuroscience
The University of Lethbridge
Alberta, Canada

November 28, 2006

TITLE: “The Evolution of Skilled Hand Movement: Its Function in Health and Disease”

John A. Dani, Ph.D.
Division of Neuroscience
Baylor College of Medicine
Houston, TX

December 5, 2006

TITLE: “Nicotinic and Dopaminergic Mechanisms Contributing to Nicotine Addiction”

Michael L. Platt, Ph.D.
Assistant Professor
Department of Neurobiology
Center for Cognitive Neuroscience
Department of Biological Anthropology & Anatomy
Duke University Medical Center
Durham, NC

December 12, 2006

TITLE: “Neuroeconomics: How the Brain Makes Decisions”

SPRING 2007 NEUROSCIENCE SEMINAR SERIES

12:00 Noon

Link Auditorium

Ryoichi Teruyama, Ph.D.
Assistant Professor
Department of Anatomy & Neurobiology
UTHSC

January 9, 2007

TITLE: “Intrinsic Membrane Properties of Neurohypophysial Endocrine Cells in the Supraoptic Nucleus”

Jack L. Feldman, Ph.D. January 23, 2007
Distinguished Professor
UCLA, Neurobiology
TITLE: **“Looking for Inspiration: New Perspectives on the Neural Control of Breathing”**

Thaddeus S. Nowak, Jr. Ph.D. January 30, 2007
Professor
Department of Neurology
UTHSC
TITLE: **“Protective ‘Preconditioning’ of Hippocampus by Global Brain Ischemia: An Approach to Mechanistic Studies Through Refinements in Modeling”**

Martha Flanders, Ph.D. February 6, 2007
Professor, Department of Neuroscience
Director of Undergraduate Education
University of Minnesota
Minneapolis, MN
TITLE: **“Neuromuscular Control of Hand Movement”**

Eve Marder, Ph.D. February 13, 2007
Victor and Gwendolyn Beinfield Professor of Neuroscience
Chair, Biology Department
Volen Center and Biology Department
Brandeis University
Waltham, MA
TITLE: **“Variability, Homeostasis, and Compensation in a Rhythmic Motor System”**

Barry Waterhouse, Ph.D. February 20, 2007
Professor, Drexel University
Department of Neurobiology & Anatomy
Philadelphia, PA
TITLE: **“Neurobiology of the Locus Coeruleus – Noradrenergic system: Translating the Basic Science of Norepinephrine to Clinical Relevance”**

Lori L. McMahon, Ph.D. March 6, 2007
Associate Professor
Department of Physiology & Biophysics
University of Alabama @ Birmingham
Birmingham, AL
TITLE: **“Hippocampal Cholinergic Denervation, Sympathetic Sprouting, and Long-Term Depression at CA3-CA1 Synapses”**

Dan Bonthius, M.D., Ph.D. March 13, 2007
Department Pediatrics
University of Iowa
Iowa City, IA
TITLE: **“Alcohol and the Developing Brain: Pharmacology, Anatomy and Gene Therapy”**

Jeff Tasker, Ph.D. March 20, 2007
Tulane University
Department Cell & Molecular Biology
New Orleans, LA
TITLE: “Novel Glucocorticoid Regulation of Hypothalamic Neuroendocrine Cells via a Novel Membrane Receptor”

Gordon Burghardt, Ph.D. March 27, 2007
Department of Psychology or
Department of Ecology & Evolutionary Biology
University of Tennessee, Knoxville
Knoxville, TN
TITLE: “Genetics, Geography and Behavior Profiling of Natricine Snakes”

Spring Break – Cancelled April 3, 2007

Todd C. Sacktor, M.D. April 10, 2007
SUNY Downstate Medical Center
Department Physiology & Pharmacology
Brooklyn, NY
TITLE: “PKMzeta, LTP Maintenance, and the Dynamic Molecular Biology of Long-Term Memory Storage”

Jian-Xing Ma, M.D., Ph.D. April 17, 2007
Professor & Laureate Chair
The University of Oklahoma Health Science Center
Department of Medicine Endocrinology
TITLE: “Retinoid Visual Cycle and Photoreceptor Degeneration”

Ron Harper, Ph.D. April 24, 2007
Distinguished Professor of Neurobiology
David Geffen School of Medicine @ UCLA
Los Angeles, CA
TITLE: “Imaging of Cerebellar and Limbic Structure and Function in Sleep-Disordered Breathing”

Harry Orr, Ph.D. May 1, 2007
Department of Genetics, Cell Biology
and Development and the Institute of Human Genetics
Minneapolis, MN
TITLE: “The Role of Protein Interactions and Cell Signaling in SCA1 Pathogenesis”

Richard Aldrich, Ph.D. May 8, 2007
Chair Section of Neurobiology
University Texas @ Austin
Austin, TX

TITLE: “Mechanisms of Voltage and Calcium Activated Potassium Channel Function”

Edward Dudek, Ph.D.

May 15, 2007

Professor and Chair

Department of Physiology

University of Utah School of Medicine

Salt Lake City, UT

TITLE: “Progressive Development of Spontaneous Seizures in Experimental Epilepsy”

John Boughter, Ph.D.

May 22, 2007

Assistant Professor

Department of Anatomy & Neurobiology

UTHSC

TITLE: “Dissection of a Central Pattern Generator”

APPENDIX 4
Neuroscience News
FY 2006-07



In Memoriam David V. Smith (1943-2006)

On September 30, 2006, David V. Smith, PhD, succumbed to a malignant brain cancer at the age of 63. Dr. Smith was Simon R. Bruesch Professor and chair of the Department of Anatomy & Neurobiology, UTHSC, and the director of the Neuroscience Institute/Center of Excellence. He is survived by his loving wife, Michiko Smith, and his three children, Bryan Smith, Laurie Lundy and Charles Smith.

On Monday, October 9, UTHSC colleagues, friends and the family of Dr. Smith gathered to celebrate his life, filling the 117-seat Link Auditorium to capacity with a standing-room-only crowd of 150. Dr. Smith, a well-loved professor and much-admired family man, contributed greatly to the development of one of the premier programs on campus. Tributes to his significant contributions in the field of neurobiology and remembrances of his positive outlook on life were made by several departmental colleagues. In addition, Dr. Smith's family shared their memories of the many times he served as an inspiration to them.

Born in Memphis, Tennessee, on April 21, 1943, David received his bachelor's (1965) and master's (1967) degrees in psychology from the University of Tennessee, Knoxville, and his Ph.D. in Psychobiology from the University of Pittsburgh in 1969. His PhD advisor was Donald H. McBurney. After completing his doctorate, David embarked on a postdoctoral fellowship with Carl Pfaffman at The Rockefeller University.

David established his first laboratory in 1971 as an assistant professor in the Department of Psychology at the University of Wyoming. He rose through the ranks to tenured professor before moving to the Department of Otolaryngology-Head and Neck Surgery at the University of Cincinnati in 1984, where he served as professor until 1994. From 1994-2002, he served as a professor in the Department of Anatomy & Neurobiology at the University of Maryland School of Medicine, and as vice chair from 1997-2002. David returned to Memphis in 2002 to lead the Department of Anatomy & Neurobiology and the Neuroscience Institute at UTHSC.

During his career David authored over 130 publications, mentored many students and fellows, held editorial posts (including executive editor of *Chemical Senses* from 2001 - 2006) and served both the NSF and NIH in review and administrative capacity. He was a founding member of the Association for Chemoreception Sciences in 1983, and served as its executive chairperson in 1985.

Over the course of his distinguished research career, David's abiding passion was the study of sensory coding. His most pervasive goal was to understand how taste information is extracted by gustatory receptor cells and encoded into neural activity, how this code is maintained during receptor cell turnover and synaptogenesis, and how these processes lead to taste perception. One of the defining characteristics of his career was to use a variety of experimental approaches. His work spanned human psychophysics, animal behavior, electrophysiology (both in vivo and in vitro), neuroanatomy and immunohistology. His studies were characterized by clear conceptualization, experimental rigor and a mathematical bent.

David created a collegial and productive atmosphere in his laboratory and in the department. His unwavering support enhanced numerous careers and created lasting friendships. He had a fine sense of duty, honor and humor, as well as an artistic flair.

Among the many honors and awards David collected throughout his illustrious career were the Claude Pepper Award (1989-1991) and Jacob K. Javits Neuroscience Award (1984-1991) from the NIH, the Frito-Lay Award for Excellence in Taste Research (1994), and the Mannheim Lectureship (Lifetime Achievement Award) from Monell Chemical Senses Center (2004). At the time of his death, Dr. Smith was administering two NIH research grants: one for more than \$1.4 million to study sensory coding in taste and another for more than \$1.1 million to research brainstem gustatory processing.

"David Smith was a great scientist, a respected leader and a terrific colleague," said William E. Armstrong, PhD, professor in the Department of Anatomy & Neurobiology in the College of Medicine. "It's a testament to his character and influence that the lasting memories for us all will be the privilege and fortune we enjoyed having such a fair and decent man as our leader and as our friend."

Michiko Smith asks that those wishing to honor David may do so by making a donation to the David V. Smith fund through the UT Development Office.

COMMENT

GUEST COLUMN

Program will explore ADD/ADHD mysteries



PAUL HERRON is an associate professor of anatomy and neurobiology at the University of Tennessee Health Science Center.

Finding causes of developmental neurological disorders is a top research priority, says **PAUL HERRON**. Today, the public can get a report from the front lines.

THE MYSTERIES behind the complex functioning of the brain and how it produces behavior have intrigued scientists and the general public for centuries. According to David Hubel, a Nobel Prize winner, the brain "is a complicated, intricately woven tissue, like nothing else we know of in the universe." Over the last 50 years, tremendous discoveries and understandings have begun to unlock some of those mysteries.

We are now experiencing the benefits of these discoveries in just about every phase of our lives. However, the pace of these discoveries is occurring much faster than the general public is aware. To improve public awareness in Memphis and as part of an international effort supported by the Dana Foundation, we at the University of Tennessee Neuroscience Institute are engaged in special activities this week to enhance the public's knowledge about the brain and behavior.

There is much to talk about. At UT and throughout the world, scientists who are doing research on the brain, called neuroscientists, are answering questions

such as: What is the mind? How does the brain produce creativity? How does the brain produce emotions such as happiness, sadness and anger? How do we learn, remember and process information? Why do we lose our memory? Why do we become addicted to cigarettes and drugs? How can we recover from strokes, spinal cord injuries and depression? How can chronic pain be relieved? What are the causes of psychiatric disorders? What are the causes of developmental neurological disorders?

These questions plus many more are receiving intense investigation by neuroscientists. However, the last one, the underlying causes of developmental neurological disorders, receives a top priority. With support from the National Institutes of Health and private foundations, neuroscientists are working to relieve the suffering of millions of Americans impaired by some form of brain disorder or injury.

Neuroscience, a relatively new science, brings together many different disciplines, including biology, physiology, anatomy, pharmacology, chemistry, physics and math to focus on the complexity of the brain.

New methods and equipment must constantly be developed to study the structure, chemistry, genetics and communication between cells in the brain.

Another key part is then to study the effects on the brain of different kinds of everyday experiences. These experiences could be anything from very rewarding play, social activities or educational experiences, to being deprived of these experiences, or using drugs. The findings from this research are then used to develop effective therapeutics for the treatment and cure of neurological disorders.

Today, the UT Neuroscience Institute will join with The Urban Child Institute to present a public program on attention deficit disorder (ADD) and attention deficit/hyperactivity disorder (ADHD). This two-hour program is especially timely because of the increasing diagnosis of these disorders in children in the Memphis metropolitan area and across the country.

Dr. William Armstrong, director of the Neuroscience Institute, will moderate presentations by two speakers. Dr. David Kube, a professor of developmental pediatrics at the University of Tennessee, will bring us up to date on current diagnosis criteria, behavioral medication and home management for ADD and

ADHD children. Dr. Margaret Semrud-Clikeman, a professor of psychology and psychiatry at Michigan State University, will speak on the recent advances in understanding the neurological basis for ADD and ADHD.

The program is designed for the general public, including parents, grandparents, caregivers, support groups, teachers and allied professionals. It will be held at The Urban Child Institute, 600 Jefferson, from 6:30 to 8:30 p.m. Refreshments will be provided.

In related activities this month, our faculty and students will be giving demonstrations and talks about the brain to primary and secondary school students. Dr. Linda Kennard, director of early childhood development and elementary literacy for the Memphis City Schools, and I will also make presentations to pre-K teachers on enhancing their teaching strategies using knowledge of brain development, learning and memory.

We hope these activities will help the general public gain more of an appreciation for how we use our brains when we are doing things normally, as well as awareness of the substantial benefits to be gained from continued research into potential treatments and cures of neurological disorders.



Brain Awareness Symposium sponsored by Urban Child and Neuroscience Institutes.

Left. Dr. Paul Herron (left) with guest speaker Dr. Margaret Semrud-Clikeman, Michigan State University.

Right. David Kube (Department of Developmental Pediatrics, UTHSC) speaks with an audience member.



***ADD and ADHD:
Advances in Understanding
and Treatment***



When

Thursday, March 22, 6:30 – 8:30 pm

Where

The Urban Child Institute 600 Jefferson Ave.

This program for the general public will feature two presentations on attention deficit disorder and attention deficit hyperactivity disorder. Dr. David Kube, Associate Professor of Developmental Pediatrics at the University of Tennessee, will discuss updates on current diagnosis criteria, behavioral medication and home management. Dr. Margaret Semrud-Clikeman, Professor of Psychology and Psychiatry at Michigan State University, will speak on the recent advances in understanding the neurological basis for ADD and ADHD. Dr. William E. Armstrong, Director of the University of Tennessee Neuroscience Institute, will moderate the program.



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

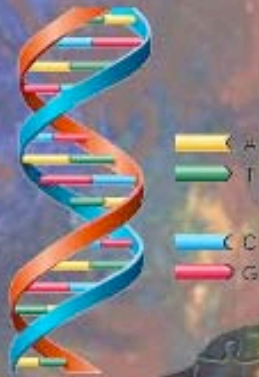


THE NEUROSCIENCE INSTITUTE

UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

Translational Neuroscience Symposium

Brain Development: New Frontiers in Autism Research



Friday, Nov. 17th
12:00 Noon- 2 PM
Link Auditorium



Wendy Stone, Ph.D.

Professor of Pediatrics and Psychology
Kennedy Center for Research on Human Development
Vanderbilt University

“Early Identification of Autism: Challenges and Strategies”

Pat Levitt, Ph.D.

Professor of Pharmacology
Director, Kennedy Center for Research on Human Development
Vanderbilt University

“Translational Research Strategies Applied to Autism”

The University of Tennessee College of Medicine is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

The University of Tennessee Health Science Center College of Medicine designates this educational activity for a maximum of 1 AMA PRA Category 1 Credit(s).[™] Physicians should only claim credit commensurate with the extent of their participation in the activity.

This course is approved for 3 CEUs by The University of Tennessee.

Please call 448-5957 for more information.



THE NEUROSCIENCE INSTITUTE

UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

Translational Neuroscience Symposium *Parkinson's Disease: The Genetic-Environmental Interface*

Friday, March 2nd

1 - 4 PM

Link Auditorium

Zbigniew Wszolek, M.D.

Professor of Neurology

Mayo Clinic, Jacksonville, FL

“Clinical Genetics of Parkinsonism”

Ronald Pfeiffer, M.D.

Professor of Neurology, UTHSC

“The Gastrointestinal System and Parkinson's Disease:

Braak and Beyond”

Mark LeDoux, M.D., Ph.D.

Professor of Neurology, UTHSC

**“Tetrahydroisoquinolines and Related Exogenous
and Endogenous Neurotoxins”**

Tim Greenamyre, M.D., Ph.D.

Professor of Neurology

Director, Pittsburgh Institute for Neurodegenerative Diseases

UPMC Endowed Chair & Chief, Movement Disorders

“How Iron Accumulates in the Parkinson's Disease Brain:

Lessons From the Rotenone Model”

Richard Smeyne, Ph.D.

Associate Member of Developmental Neurobiology

St. Jude Children's Research Hospital

“Exercise and Disease Progression in Parkinson's Disease”

The University of Tennessee College of Medicine is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

The University of Tennessee Health Science Center College of Medicine designates this educational activity for a maximum of 1.0 AMA PRA Category 1 Credit (s).[™] Physicians should only claim credit commensurate with the extent of their participation in the activity.

This course is approved for 1 CUEU's by The University of Tennessee.

Please Call 448-5957 for more information



THE NEUROSCIENCE INSTITUTE

UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

Translational Neuroscience Symposium

Neuroplasticity of Addiction

Friday, May 11

1 - 4 PM

Link Auditorium

Burt M. Sharp, M.D.

Professor of Pharmacology, UTHSC

**“Gestational Exposure to Nicotine Selectively Alters
Nicotinic Receptor Expression, Neurotransmission and Behavior
in Adolescents”**

Elliot A. Stein, Ph.D.

Chief, Neuroimaging Research Branch,

National Institute on Drug Abuse, Intramural Research Program

**“Abnormalities in brain function that contribute to the
development and maintenance of drug dependence”**

Jeffery D. Steketee, Ph.D.

Professor of Pharmacology, UTHSC

**“Repeated exposure to cocaine alters cortical
regulation of limbic reward pathways”**

Rita Z. Goldstein, Ph.D.

Scientist, Medical Research

Brookhaven National Laboratory, Upton, NY

**“The prefrontal cortex in reward processing and response
inhibition in cocaine addiction: evidence for compromised
function from functional neuroimaging studies in humans”**

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FIVE-STATE DEMO FOCUSED ON NEED FOR INCREASED TELEMEDICINE FUNDING

State and national government officials met in April at a video teleconference in the Hamilton Eye Institute, hosted by the UT Health Science Center Telemedicine Program. The event featured a brief multi-state demonstration on how telemedicine is used to deliver specialized health care from academic medical centers to underserved rural hospitals and clinics in Colorado, Louisiana, Minnesota, Tennessee and Virginia. Agriculture Secretary Mike Johanns (via video-teleconference from Washington, D.C.), USDA Under



From left: Michael R. Caudle, MD, vice chancellor for Health System Affairs, and USDA Secretary Mike Johanns (on screen)

Secretary Thomas C. Dorr and USDA Rural Development State Director Mary Ruth Tackett (both in Memphis) spoke at the event, discussing proposed increases in funding for telemedicine, distance learning and critical-access hospitals in the 2007 farm bill proposals now before Congress. The need for additional federal funding for Telemedicine and Distance Learning is addressed in the proposals.

This event provided an opportunity to discuss the proposals and demonstrate the value of telemedicine technology. USDA recommends an infusion of \$500 million to address the backlog of applications for rural infrastructure grants and loans, including eligible Telemedicine and Distance Learning grant applications. Additionally, USDA calls for \$1.6 billion in Rural Development direct and guaranteed loans to complete the reconstruction and rehabilitation of all 1,283 currently certified rural critical access hospitals. More information on the 2007 Farm Bill proposals is available at: www.usda.gov.



From left: Randall Scott, MD, radiologist at UT Medical Group, and Michael R. Caudle, MD



The Black Student Association held their 15th Annual BSA Ball in April at the Memphis Marriott Downtown. Head table, from left to right: Curtis (C.J.) Holmes (BSA president and dentistry student), Juliette Sandifer (medical student), Miranda Hallett (Graduate Health Sciences student), Ani Isen (physical therapy student), Bianca Clark (dentistry student), Mitzi Milligan (BSA Ball chair and pharmacy student) and Veronica Mallet, MD, (keynote speaker and UTHSC OB/GYN chair).

JOURNAL CLUB & GRAND ROUNDS TO MEET

The College of Medicine's Division of Endocrinology announces its Journal Club will meet every Tuesday at 4 p.m. in F302 Coleman. Grand Rounds will meet every Thursday at 10 a.m. in F302 Coleman. Speaker TBA; more info: bmscott@utmcm.edu

EMPLOYEES HONORED AT EAP AWARDS CEREMONY

Four UT Health Science Center employees were honored at the Employee Assistance Program (EAP) Awards Ceremony this April in Nashville, Tenn. The ceremony was held to recognize institutions promoting EAP during the month of March. Cynthia Tooley, employee relations coordinator, and Tiffany Trice, administrative aide, both in the Office of Equity and Diversity, coordinated EAP awareness activities, booths and displays for UTHSC employees. They received the Outstanding Participation trophy for the university's commitment to promoting the program.

Michael Alston, director of the Office of Equity and Diversity, stated, "During EAP month, the goal was to re-enlighten Health Science Center employees about EAP being a confidential counseling resource, a human resource consultation tool for managers and supervisors and an inexpensive training and education resource for the organization as a whole. Based on the campus' participation, we achieved statewide recognition for the third consecutive year. I believe this accomplishment is the result of Cynthia and Tiffany doing a spectacular job in their promotion of EAP as a problem-solving tool and resource for employees when there is a need."

Carole Rhodes in Human Resources and Wanda Thompson in Campus Security also received individual certificates for the "Preparing for a Major Change" essay contest. They described how they dealt with the stresses of change, and they also identified skills they used to keep themselves and others functional. Carole and Wanda received this honor in 2006 and this year.



From left: Carole Rhodes, Cynthia Tooley, Tiffany Trice and Wanda Thompson

UT NEUROSCIENCE INSTITUTE AWARDS FELLOWSHIPS

The UT Neuroscience Institute recently awarded the 2007-2008 Merit Fellowships for Undergraduate Neuroscience Research to two area students, who will begin working in UTHSC labs this summer. Indre Augustinaite, of Christian Brothers University, and Joel Chasan, of Rhodes College, were selected by a committee at their respective institutions based on their academic excellence and strong interest in neuroscience.

Joel will be working with Shannon Matta, PhD, in pharmacology, who studies the mechanisms of nicotine addiction. Indre will be working with Matt Ennis, PhD, in anatomy and neurobiology, who studies both olfactory neural circuits and central pain processing.

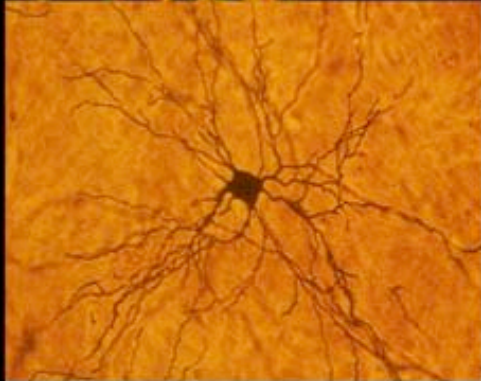
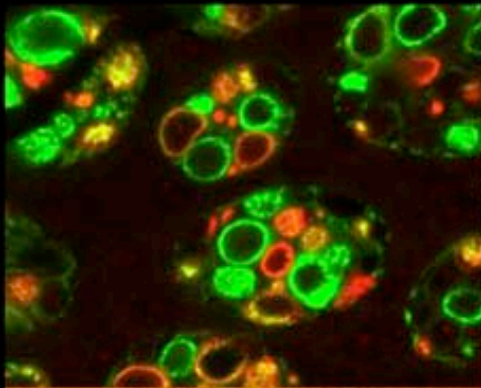


THE
NEUROSCIENCE INSTITUTE
UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER



**St. Jude Children's
Research Hospital**
ALSAC • Danny Thomas, Founder

Graduate Studies in Neuroscience



Neuroscience Studies at the University of Tennessee Health Science Center are a part of a multidisciplinary and interdepartmental program including the Departments of Anatomy and Neurobiology, Molecular Sciences, Pathology, Pharmacology, and Physiology. This program provides a broad background in neuroscience and specific research training in neurochemistry, neurophysiology, neuropharmacology, molecular and cellular neuroscience, developmental neurobiology, and behavioral neuroscience, leading to the Ph.D. degree.

Established in 1985, the multidisciplinary Neuroscience Institute houses over 80 faculty from several departments and colleges at UT. The faculty hold positions in the departments of Anatomy and Neurobiology, Medicine, Molecular Sciences, Neurology, Neurosurgery, Ophthalmology, Pathology, Pharmaceutical Sciences, Pharmacology, Physiology, Surgery, and Biomedical Engineering. Some faculty members also hold primary appointments at St. Jude Children's Research Hospital, just a short distance away.

UT Neuroscientists focus on research dealing with neurological and neurodegenerative disorders, excitable properties of neurons and synaptic function, sensory information processing, brain tumor biology, vision and retinal biology, neurogenetics and neural development, neuropharmacology of mental and addictive disorders, and intracellular signaling in neurons. UTHSC is one of the world's leading centers exploiting novel genomic approaches to explore brain development, CNS function and behavior, and psychiatric and neurodegenerative diseases.

Graduate Studies in Neuroscience

To apply for the Neuroscience Track, please go to the Integrated Program in Biomedical Science (IPBS) website.

<http://www.utmem.edu/grad/IPBS>

To find out more about the program, please visit our website.

<http://www.utmem.edu/neuroscience>

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