NeuroAIDS, Other Neurodegenerative Disorders, and Mental Health
The Role of Brain Banks

4th Annual Colloquium

Durham Research Center Auditorium
Omaha, Nebraska

Wednesday, May 21, 2014  8 am - 3 pm
Cover image: Courtesy Army Medical Command
OVERVIEW

Crucial in our knowledge of neuroscience is the use of human brain and other nervous system tissue in research. This has led to significant advancements in our understanding of neurodegenerative, psychiatric and developmental diseases. High quality specimens and information regarding the premortem disease characteristics are essential in the quest to understand, prevent, and treat these conditions.

Many research techniques are now available to use these valuable specimens, thereby providing unprecedented amounts of data. Researchers need continued acquisition of specimens to take advantage of new technologies and to follow disorders whose phenotype and etiopathogenesis is changing, such as the case in HIV-associated neurocognitive disorders.

In this colloquium, experts in brain banking and biomedical research will share the challenges and opportunities in brain and biospecimen banking, research findings resulting from the use of these specimens, and other current exciting aspects of neuroscience and mental health research.

PROGRAM SPONSORS

Chronic HIV Infection and Aging in NeuroAIDS (CHAIN) Center
(PI: Howard S. Fox, MD, PhD)
University of Nebraska Medical Center Development Fund
(PI: Shilpa Buch, PhD)
Department of Pharmacology and Experimental Neuroscience
University of Nebraska Medical Center, Omaha, NE
(Howard E. Gendelman, MD, Chair)

A special thank you to:
The National Institute of Mental Health, National Institutes of Health for its support of the CHAIN Center.
PROGRAM
8:00 am
Howard S. Fox, MD, PhD, University of Nebraska Medical Center
Welcome
Session 1: Howard S. Fox, MD, PhD, Moderator
8:10 am
Susan Morgello, MD, Icahn School of Medicine at Mount Sinai
Drugs of abuse and HIV: The value of brain banks in highly confounded populations
8:35 am
Brett Morrison, MD, PhD, Johns Hopkins University, School of Medicine
Oligodendrocyte Death and Failed Metabolic Support Contribute to Neurodegeneration in ALS
9:00 am
Gustavo Turecki, MD, PhD, McGill Group for Suicide Studies, Douglas Mental Health University
Early-life adversity and suicide risk: using postmortem brain tissue to gain insight into this complex relationship
9:25 am
Tsuneya Ikezu, MD, PhD, Boston University
Microglia and exosome-mediated dissemination of pathogenic tau protein in Alzheimer’s disease
9:50 am
Break
Session 2: Shilpa Buch, PhD, Moderator
10:05 am
Benjamin B. Gelman, MD, PhD, University of Texas Medical Branch
Investigating neuroAIDS-related neural transmission and neuropharmacology using human brain specimens
10:30 am
Tony Wilson, PhD, University of Nebraska Medical Center
Focusing studies of HIV brain tissue using MEG maps of functionally impaired regions
10:55 am
Eliezer Masliah, MD, University of California, San Diego
Alterations in CDK5 signaling and therapeutic opportunities for aging and toxicity associated with NeuroAIDS
11:20 am
Charles Wood, PhD, University of Nebraska, Lincoln
HIV infected brain banking in sub-Saharan Africa - lessons learned
11:45 am
Lunch
Session 3: Howard E. Gendelman, MD, Moderator
12:45 pm
William Yong, MD, Jonsson Cancer Center and Brain Research Institute, David Geffen School of Medicine at UCLA
From brain tumors to dementia - optimizing the procurement, storage, and quality of biobank specimens
1:10 pm
Babu Guda, PhD, University of Nebraska Medical Center
Fueling neuroscience research using brain bank databases
1:35 pm
Break
1:50 pm
Panel Discussion
All presenters
2:45 pm
SUMMARY
Howard S. Fox, MD, PhD, University of Nebraska Medical Center
Welcome

Session 1: Howard S. Fox, MD, PhD, Moderator

Susan Morgello, MD, Icahn School of Medicine at Mount Sinai
Drugs of abuse and HIV: The value of brain banks in highly confounded populations

Brett Morrison, MD, PhD, Johns Hopkins University, School of Medicine
Oligodendrocyte Death and Failed Metabolic Support Contribute to Neurodegeneration in ALS

Gustavo Turecki, MD, PhD, McGill Group for Suicide Studies, Douglas Mental Health University
Early-life adversity and suicide risk: using postmortem brain tissue to gain insight into this complex relationship

Tsuneya Ikezu, MD, PhD, Boston University
Microglia and exosome-mediated dissemination of pathogenic tau protein in Alzheimer’s disease

Break

Session 2: Shilpa Buch, PhD, Moderator

Benjamin B. Gelman, MD, PhD, University of Texas Medical Branch
Investigating neuroAIDS-related neural transmission and neuropharmacology using human brain specimens

Tony Wilson, PhD, University of Nebraska Medical Center
Focusing studies of HIV brain tissue using MEG maps of functionally impaired regions

Eliezer Masliah, MD, University of California, San Diego
Alterations in CDK5 signaling and therapeutic opportunities for aging and toxicity associated with NeuroAIDS

Charles Wood, PhD, University of Nebraska, Lincoln
HIV infected brain banking in sub-Saharan Africa - lessons learned

Lunch

Session 3: Howard E. Gendelman, MD, Moderator

William Yong, MD, Jonsson Cancer Center and Brain Research Institute, David Geffen School of Medicine at UCLA
From brain tumors to dementia - optimizing the procurement, storage, and quality of biobank specimens

Babu Guda, PhD, University of Nebraska Medical Center
Fueling neuroscience research using brain bank databases

Break

Panel Discussion - All presenters

Summary
Dr. Benjamin B. Gelman grew up in the Cleveland area. He majored in Renaissance literature with a minor in biochemistry at Ohio University and received graduate training in neurochemistry under Arthur Michaelson at the University of Cincinnati, where he performed some early work on oxidative injury in the brain. His postdoctoral work was done in Dr. Eric Gruenstein’s laboratory on protease mediated muscle injury. After receiving his MD and PhD degrees, residency and fellowship training in anatomic and neuropathology were done at the University of North Carolina (UNC) where he published neurochemical reports addressing demyelinating peripheral neuropathy. After a year on the faculty at UNC, he moved to the University of Texas at the Medical Branch in Galveston where he rose through the academic ranks and remains. Over the years he shouldered a variety of clinical service staff and educational assignments including residency program direction.

Dr. Gelman’s interest in HIV-associated neuropathology began in 1992 and led eventually to the establishment of a National NeuroAIDS Tissue Consortium (NNTC) specimen repository in Galveston. Dr. Gelman also is one of the six site investigators of the CNS HIV Health Effects Research (CHARTER) project. Focusing primarily on the neurochemistry of human specimens, Dr. Gelman’s laboratory published work on a variety of neuroAIDS topics including the clinical-neurovirological correlation, synaptic transmission and protein turnover, brain gene expression, neuronal channelopathies, iron metabolism and peripheral neuropathy. His most recent focus of interest is the anatomical and cellular localization of latent HIV DNA in the body of patients treated with combinatorial antiretroviral therapy.

Dr. Gelman has been married to his wife, Diane, for 39 years; they have three grown children. He likes opera, biking, poker theory, equity options and his meteorite collection. Eventually, he wants to get a dog.
Dr. Chittibabu (Babu) Guda was formally trained in both molecular biology and computer science. He obtained his PhD from Auburn University in 1997 and trained as a postdoc at Iowa State University and the University of California, San Diego (UCSD). Later, he worked as a Project Scientist and Instructor in Bioinformatics at UCSD. In 2004, he accepted a tenure-track position as an Assistant Professor at the Cancer Research Center of the State University of New York. In 2010, Babu Guda moved from SUNY-Albany to the University of Nebraska Medical Center as an Associate Professor in the Department of Genetics, Cell Biology and Anatomy and as the Director of the Bioinformatics and Systems Biology Core.

Dr. Guda’s research encompasses a range of topics in cancer genomics and neuroinformatics related to the understanding and interpretation of biological data. The current projects in his laboratory are focused on molecular subtyping of breast cancers using machine-learning methods, prediction of fusion genes from RNA-seq data, functional characterization of glioblastoma tumors and subtypes using multi-omics data, and developing gene expression models of healthy human brains to study neurodevelopmental disorders. Dr. Guda has trained or mentored five postdocs, 10 PhD, and four MS students in his laboratory. He has been the PI or co-I of four NIH-funded research projects including the National NeuroAIDS Tissue Consortium-Data Coordination Center (NNTC-DCC) with Dr. Howard Fox.

Dr. Guda has published over 60 peer-reviewed research articles that cover a wide range of topics related to bioinformatics, systems biology and cancer genomics. He works on editorial boards, delivers lectures at national and international conferences, actively participates on several NSF/NIH study sections, and organizes scientific conferences. As the director of Bioinformatics Core, Dr. Guda provides services and collaborates with many investigators (in and outside of UNMC) to analyze and publish experimental data.
Dr. Ikezu completed his undergraduate education at the University of Tokyo School of Science and Arts, Japan. He earned his MD in 1991 and PhD degrees from the University of Tokyo School of Medicine in 1997. He had pre- and post-doctoral fellowships at the University of California, San Francisco (Immunology), Massachusetts General Hospital (Pharmacology) and Cleveland Clinic Foundation (Neuroscience) before joining the University of Nebraska Medical Center (Pathology & Microbiology and Pharmacology and Experimental Neuroscience) as a faculty member from 1999-2010. He was Deputy and Associate Director of the Center for Neurovirology and Neurodegenerative Disorders and later Director of the Center of Neurodegenerative Disorders. He also directed confocal microscopy and brain bank core facilities affiliated with the department. He joined the Boston University School of Medicine’s Department of Pharmacology and Experimental Therapeutics with a joint appointment in the Department of Neurology in 2010 as a Professor.

Dr. Ikezu’s laboratory has been investigating the involvement of microglia in the pathophysiology of neurodegenerative disorders, such as Alzheimer’s disease, frontotemporal dementia, and HIV-associated dementia using various transgenic and gene-targeted mouse models and virus-mediated gene delivery systems.

He has consistently published his research in first-rate journals, such as *Brain, The Journal of Biological Chemistry, EMBO Journal, Blood, The Journal of Neuroscience, Proceedings of the National Academy of Sciences* and *Science Translational Medicine*. He has also edited the textbook *Neuroimmune Pharmacology*, Springer 2008, with Dr. Howard E. Gendelman; the second edition is due in the Fall of 2015.
Eliezer Masliah received his MD degree from the National Autonomous University of Mexico in 1982, completing a post-graduate residency training in Pathology at the National Institutes of Health in Mexico City in 1986. Dr. Masliah completed a fellowship in neuropathology and neurodegenerative disorders at the University of California, San Diego (UCSD) in 1989. Dr. Masliah was recruited by both the departments of Neurosciences and Pathology at UCSD where he is currently Tenured Professor, Director of the Laboratory of Experimental Neuropathology and Director of the Autopsy Service at the UCSD-Medical Center. Dr. Masliah has published over 500 original research articles and 50 book chapters, and he holds 10 patents.

The laboratory of Dr. Masliah is dedicated to investigating the molecular mechanisms of synaptic degeneration and developing new therapies for neurological disorders such as Alzheimer’s Disease (AD), Parkinson’s Disease (PD) and NeuroAIDS. Dr. Masliah’s laboratory has developed transgenic mouse models of these neurodegenerative disorders and is actively involved in better understanding the mechanisms of synaptic damage and at developing novel treatments for these devastating disorders including gene therapy, immunotherapy and small molecule approaches to reduce protein misfolding and aggregation. His laboratory investigates the alterations in autophagy and signaling mediated by CDK5 in AD, PD and NeuroAIDS. In recent years, his laboratory has investigated the mechanisms of prion-like dissemination of α-synuclein and its role in PD and other neurodegenerative disorders. Moreover, his laboratory has developed new gene therapy and immunotherapy approaches directed at modulating CDK5 and reducing the accumulation of Abeta, Tau and α-synuclein that hold the promise at helping develop new therapies that will enhance the clearance and reduce the synaptic pathology in neurodegenerative disorders.
Dr. Susan Morgello completed her undergraduate studies at the Massachusetts Institute of Technology and earned her MD at Duke University Medical School. She completed a residency in Anatomic and Clinical Pathology at The New York Hospital, where she also had her subspecialty training in Neuropathology. In 1990 she was recruited to the Mount Sinai Medical Center in New York, where she is currently Tenured Professor of Neurology, Neuroscience and Pathology.

Dr. Morgello is principal investigator for the Manhattan HIV Brain Bank (MHBB; www.mhbb.org; member of the National NeuroAIDS Tissue Consortium), a multidisciplinary research resource founded in 1998. The MHBB supplies clinical information and biospecimens for ongoing neuroAIDS research in diverse laboratories. It provides a robust infrastructure to recruit and train young scientists in the neuroAIDS field. The specific focus of MHBB is to better define the role of HIV and its co-morbidities in the generation of cognitive and neurologic deficits in the era of combined antiretroviral therapies (cART). The MHBB cohort is a highly complex, predominantly inner-city minority population with high rates of substance abuse and psychiatric disorders. Through attention to careful clinical phenotyping, MHBB has been integral to studies demonstrating the impact of cART on global brain gene expression, the impact of chronic opiates on neuroinflammation and cognitive disorders, and the neurobiologic effects of chronic hepatitis C virus infection, a common pathogen in individuals suffering with HIV.

Dr. Morgello is also principal investigator of the Mount Sinai Institute for NeuroAIDS Disparities (MSINAD; www.msinad.org). This summer institute provides mentoring and pilot grant awards to young scientists beginning translational or behavioral neuroAIDS research. The mission of MSINAD is to recruit, educate and promote the scientific workforce investigating neuroAIDS disorders in minority populations. Programs like MSINAD help to assure that adequate focus on neuroAIDS disorders will continue into succeeding generations of scientists.
Dr. Morrison received his MD and PhD from Mount Sinai Medical School, New York City in 2001. In his PhD thesis, he began his studies of the pathogenesis of amyotrophic lateral sclerosis (ALS) investigating mechanisms of cell-specific degeneration in a mouse model of ALS. He completed his medical internship at the University of Maryland, neurology residency at The Johns Hopkins Hospital, and a clinical neurophysiology fellowship at The Johns Hopkins Hospital. During his clinical training, Dr. Morrison continued to study ALS, specifically the benefit of maintaining muscle bulk and strength despite continued motor neuron degeneration.

Following his training, Dr. Morrison was appointed to the neurology faculty at Johns Hopkins University in 2006 and is currently an Assistant Professor in Neurology. Dr. Morrison maintains a neuromuscular clinic where he sees adult patients with ALS, peripheral neuropathies, myasthenia gravis and muscle diseases including myopathy and muscular dystrophy.

Dr. Morrison continues to be interested in ALS and has led the effort in Dr. Jeffrey Rothstein’s laboratory at Johns Hopkins to understand the unexpected, but major, role played by oligodendrocytes in the pathogenesis of ALS. He also studies the role of monocarboxylate transporters, which are the primary transporters for lactate, pyruvate and ketone bodies in the body, in oligodendrocytes during normal function and disease. In addition to investigating these transporters in ALS, Dr. Morrison also studies their role in multiple sclerosis and peripheral nerve regeneration. His work has led to an expanded view of oligodendrocyte function, proving that they are key metabolic supporters of neuron function, and future contributions will be aimed at manipulating these transporters to provide novel pharmaceutical targets for human diseases.
Gustavo Turecki is an award-winning Canadian researcher and clinician who has devoted his career to improving our understanding of what makes people commit suicide.

Dr. Turecki is a Professor of Psychiatry and Human Genetics at McGill University, Montreal, Canada. He obtained his MD in 1989 and a specialty in psychiatry in 1994 from UNIFESP, Sao Paulo, Brazil. In 1999, he received his PhD in neurosciences with a concentration in genetics from McGill.

Dr. Turecki holds a William Dawson Chair and is the Director of the McGill Group for Suicide Studies and the Quebec Suicide Brain Bank. In addition, he is the Vice-Chair of Research and Academic Affairs of the Department of Psychiatry at McGill University, the president of the International Academy of Suicide Research, and the director of the Réseau québécois de recherche sur le suicide.

Dr. Turecki’s clinical and research interests are focused on the study of the brain of suicidal and depressed individuals. His work has contributed to our understanding of suicide, and in particular, he has conducted pioneering research that has led to our understanding of how traumatic life experiences impacts the brain function and increases long-term risk for suicide.

In addition to his many accomplishments, Dr. Turecki has authored over 300 publications, including research articles in leading peer-reviewed journals such as Nature Neuroscience, Proceedings of the National Academy of Sciences and JAMA Psychiatry, among others, as well as book chapters. He has also received numerous grants and distinctions including several scientific awards, such as the NARSAD Michael Kaplan Investigator Award, the American Foundation for Suicide Prevention Distinguished Investigator Award and their 2012 Career Science Award, and the 2010 Radio-Canada Researcher of the Year, among others. He also serves, or has served, in the advisory boards of several scientific journals.

Dr. Turecki is also an engaged clinician and heads the Depressive Disorders Program at the Douglas Mental Health University Institute, where he treats patients with refractory major depressive disorder.
Dr. Tony W. Wilson attended the University of Texas at Austin and Midwestern State University where he graduated summa cum laude with majors in psychology and biology. Tony completed his doctoral training in cognitive neuroscience in the laboratory of National Academy member Dr. Apostolos Georgopoulos at the University of Minnesota, where he was a National Institute of Child Health and Human Development (NICHD) predoctoral fellow. At the time, this work utilized the only high-density magnetoencephalography (MEG) system in the United States. Following doctoral training, Dr. Wilson completed a National Institute of Mental Health (NIMH) postdoctoral traineeship in clinical cognitive neuroscience under Dr. Donald Rojas in the Department of Psychiatry’s Neuromagnetic Imaging Center, University of Colorado Health Sciences Center in Denver. As a postdoctoral fellow, Tony developed high-density MEG techniques that could be applied in clinical research settings to evaluate patients with schizophrenia and other severe psychiatric disorders.

Dr. Wilson joined the University of Nebraska Medical Center (UNMC) in 2009 to oversee the University’s new MEG brain imaging program. Tony’s primary appointment is in the Department of Pharmacology and Experimental Neuroscience; he holds a joint appointment in the Department of Neurological Sciences. Dr. Wilson is also the Scientific Director of the Center for MEG at UNMC, which houses a state-of-the-art whole-brain neuromagnetometer.

Tony has published over 35 peer-reviewed journal articles and received research support from the National Institutes of Health, several private foundations and industry. Dr. Wilson’s research focuses on identifying the brain mechanisms that underlie the incidence and progression of HIV-associated cognitive disorders and Parkinson’s disease in human patients.
Charles Wood is the founding director of the Nebraska Center for Virology established in 2000 with an IDeA COBRE award from the National Institutes of Health. The Center links virologists at Nebraska’s three major biomedical institutions who conduct basic research on the ways viruses and other infectious agents cause disease.

Dr. Wood earned his PhD in Microbiology from Columbia University in 1981 in the laboratory of Professor Elvin Kabat and served as a research associate in the laboratory of Susumu Tonewaga at the Massachusetts Institute of Technology from 1981-1983. From 1983-1985, Dr. Wood served as group leader/staff scientist at Abbott Labs, where he was on the team that developed the first HIV test that was approved for worldwide use. He joined the microbiology faculty of the University of Kansas in 1985 and became associate professor in 1989. In 1992, Wood became the Director of the Division of Neurovirology at the University of Miami, a position he held until joining the University of Nebraska, Lincoln faculty in 1996.

His wide-ranging research interests include studies of HIV and human herpesvirus pathogenesis and transmission from mothers to infants, the evolution of HIV, HIV encephalitis, and pediatric HIV. His funded research projects vary from basic research into the functional genomics of viral replication to patient-based epidemiological. He also established and directs the NIH-funded Fogarty International Training Program in HIV/AIDS Malignancies, which provides training for Zambian and Chinese biomedical scientists and health care providers to increase their expertise in performing biomedical, behavioral and preventative research on HIV, NeuroAIDS and AIDS-associated malignancies.
Dr. William Yong is Professor of Pathology and Laboratory Medicine at the David Geffen School of Medicine at the University of California, Los Angeles (UCLA).

Dr. Yong obtained a Bachelors degree in Molecular Biology at UC Berkeley and a Masters degree in Biology (Cellular and Molecular) at San Francisco State University. He attended medical school at UCLA where he completed his Honors thesis research with Professor Harry Vinters and graduated as a Dean’s Scholar. He trained in Pathology and Laboratory Medicine at Massachusetts General Hospital, Harvard Medical School, where he worked in the molecular neuro-oncology laboratory of Dr. David Louis. He completed his neuropathology fellowship at UCLA. Subsequently, he was the Director of Neuropathology at Cedars-Sinai Medical Center for eight years before returning to the UCLA Medical Center. He was a recipient of the Lucien Rubinstein Award from the American Association of Neuropathologists (AANP) for work in neuro-oncology. He was a co-recipient of the Moore Award also from the AANP.

Dr. Yong is currently Director of the UCLA Brain Tumor Translational Resource and of the UCLA Neuropathology Fellowship Program. He serves on several editorial boards and is a co-author of *Neuropathology, 3rd Edition*, a widely used text. He has long experience in biobanking, supporting AIDS, Alzheimer, stroke and brain tumor banking programs. His areas of interest include diagnostics and therapy for brain tumor as well as biospecimen science.
**Howard E. Gendelman, MD**  
*University of Nebraska Medical Center*

Dr. Gendelman joined UNMC in 1993 and is the Margaret R. Larson Professor of Internal Medicine and Infectious Diseases and Chair of the Department of Pharmacology and Experimental Neuroscience.

Under Dr. Gendelman’s leadership, contributions were made in understanding how alterations in mononuclear phagocyte function induce metabolic changes in the brain and ultimately lead to neural cell damage. These have had broad implications in preventing, slowing or reversing infectious, metabolic and degenerative disorders of the nervous system.

402.559.8920  
hegendel@unmc.edu

---

**Shilpa Buch, PhD**  
*University of Nebraska Medical Center*

Dr. Buch relocated from Kansas to the University of Nebraska Medical Center (UNMC) in 2009 to build onto an already stellar career in studies of how HIV and drugs of abuse affect nervous system function. She is a Professor and current Vice Chair for Research in the Department of Pharmacology and Experimental Neuroscience.

Currently, her primary research focus is aimed at understanding the molecular mechanisms by which drugs of abuse such as cocaine and morphine, synergize with HIV-1/HIV proteins to enhance progression of HIV-1 associated neurological disorders. Specifically, using a multipronged approach comprised of *in vitro* cell systems, complemented with rodent models, the higher more relevant macaque model of SIV pathogenesis, and archival human tissue, her research aims to dissect the mechanism(s) of CNS pathology triggered by the host-virus interplay.

402.559.3165  
sbuch@unmc.edu

---

**Howard S. Fox, MD, PhD**  
*University of Nebraska Medical Center*

Dr. Fox joined the Department of Pharmacology and Experimental Neuroscience at UNMC in 2008 to further expand the basic and translational aspects of his work. In 2010, he was named the UNMC College of Medicine Senior Associate Dean of Research and Development.

Dr. Fox’s work focuses on knowledge learned from the SIV/nonhuman primate model of neuroAIDS. In addition to functional, neuropathologic and neuroimmune findings, he has integrated high-density data acquisition and analysis through transcriptomic, proteomic and metabolomic technologies with a systems biology approach to better understand, prevent and treat these disorders resulting from brain infection by HIV.

402.559.4821  
hfox@unmc.edu
Acknowledgments:

Information Technology Services
University of Nebraska Medical Center

Administrative Staff
Department of Pharmacology and Experimental Neuroscience
University of Nebraska Medical Center