

March 27, 2018

## CURRICULUM VITAE

### Edward D. Hall, Ph.D

William R. Markesbery, M.D. Chair in Neurotrauma Research  
Spinal Cord and Brain Injury Research Center  
and

Professor of Neuroscience, Neurology, Neurosurgery  
and Physical Medicine & Rehabilitation

University of Kentucky Chandler Medical Center

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### PERSONAL

Home Address	146B Rumsey Circle Versailles, KY 40383
Date and Place of Birth	June 16, 1950. Bedford, Ohio
Marital Status	Married 9/12/70 to Marilyn Frances Gay
Children	Edward William, born 8/09/74 Christian David, born 2/16/76

### EDUCATION

High School	Aurora Sr. High School, Aurora, Ohio. 1968.
College	B.S. (Biology), Mount Union College, Alliance, Ohio (1972). Advisor: Leonard G. Epp, Ph.D.
Graduate	Ph.D. (Pharmacology), Cornell University Graduate School of Medical Sciences, New York, NY (1976). "Glucocorticoid Preservation of Motor Nerve Function During Early Degeneration". Thesis advisor: Dr. Walter F. Riker, Jr.
Postdoctoral Fellowship	Department of Pharmacology, Cornell University Medical College, New York, NY. Sponsor: Walter F. Riker, Jr.M.D., April 1976-December 1977

### SCHOLARSHIPS AND FELLOWSHIPS

Aurora, Ohio, Kiwanis Scholarship, 1968.

National Institute of General Medical Sciences Predoctoral Fellowship, Cornell University Graduate  
School of Medical Sciences, New York, NY. 1972-1976.

NINCDS supported Postdoctoral Fellowship, Cornell University Medical College, New York, NY.  
1976-1977.

## **PROFESSIONAL APPOINTMENTS**

### **UNIVERSITY OF KENTUCKY- July, 2002- Present**

- Director, Spinal Cord & Brain Injury Research Center (SCoBIRC) 2002-2012
- Professor of Anatomy & Neurobiology (with Tenure)
- Professor of Neurosurgery
- Professor of Neurology
- Professor of Physical Medicine & Rehabilitation

### **PFIZER GLOBAL RESEARCH AND DEVELOPMENT- May, 2000-June, 2002**

- Senior Director, CNS Pharmacology (Ann Arbor); March, 2001- June, 2002
- Director, Neuroscience Therapeutics (Ann Arbor); May, 2000-March, 2001

### **WARNER-LAMBERT/PARKE-DAVIS- Dec, 1997-April, 2000**

- Senior Research Fellow and Director, Neurology Section, Neuroscience Therapeutics; December, 1999-April, 2000
- Senior Research Fellow and Group Leader, Neuropharmacology, Neuroscience Therapeutics. December, 1997-December, 1999
- Adjunct Professor of Pharmacology, Northeastern Ohio Universities College of Medicine. 1990-2000.

### **UPJOHN/PHARMACIA & UPJOHN, INC.- Sept, 1982-Dec, 1997**

- Distinguished Scientist VI, CNS Diseases Research. December, 1996-December, 1997
- Senior Scientist V, CNS Diseases Research. August 1992-December, 1996.
- Program Leader, Neurological Disorders Program. December 1992-June 1995.
- Program Leader, Reactive Oxygen Program. February 1990-December 1992.
- Senior Scientist IV, CNS Diseases Research. March 1990-July 1992.
- Pre-Clinical Director, Upjohn-London (Univ. of Western Ontario), Neuroscience Program. August 1990-December 1991.
- Senior Research Scientist III, CNS Diseases Research. January 1985-February 1990.
- Research Scientist II, CNS Diseases Research. October 1982-December 1984.
- Clinical Associate Professor, Physicians Assistants Program, Western Michigan University, Kalamazoo, MI. March 1983-1989.

### **NORTHEASTERN OHIO UNIVERSITIES COLLEGE OF MEDICINE – Jan, 1978-Oct, 1982**

- Adjunct Professor of Pharmacology, Northeastern Ohio Universities College of Medicine. 1990-2000.
- Adjunct Professor of Biological Sciences, Western Michigan University. 1993-1997.
- Adjunct Associate Professor of Pharmacology, Northeastern Ohio Universities College of Medicine. 1987-1990.
- Visiting Professor of Pharmacology, Northeastern Ohio Universities College of Medicine. 1983-1987.
- Associate Professor of Pharmacology (granted with tenure), Northeastern Ohio Universities College of Medicine. January 19, 1982-October, 1982.
- Assistant Professor of Biological Sciences, Kent State University Graduate College, Kent, Ohio. Neurobiology Area Committee. July 1978.
- Assistant Professor of Pharmacology, Northeastern Ohio Universities College of Medicine, Rootstown, Ohio. January 1978-January 1982.

### **HONORS/AWARDS**

- Phi Sigma Award (Phi Sigma National Biological Honorary), Mount Union College. 1972.
- Sigma XI, Kent State Chapter. 1978; Univ. Michigan Chapter, 1998-2002.
- Educator of the Year, WMU Physicians Assistant Program. 1987.
- Fred Kagan Award "For Outstanding Achievement in Discovery Research," The Upjohn Company, 1988.
- Upjohn Achievement in Science and Medicine Award, 1991.
- President, National Neurotrauma Society, 2007-2008.
- Elected to National Spinal Cord Injury Association Hall of Fame, 2008
- William R. Markesbery, M.D. Chair in Neurotrauma Research, 2011-Present
- University of Kentucky Research Professorship Award, 2016
- Aurora (Ohio) Senior High School Distinguished Alumni Hall of Fame Award, 2016
- National Neurotrauma Society Founders Award, 2017

### **PROFESSIONAL AFFILIATIONS**

- American Society for Pharmacology and Experimental Therapeutics. 1980-Present.
- Society for Neuroscience. 1976-Present
- New York Academy of Science. 1976-1999.
- Sigma Xi. 1978-1983; 1998-2012.
- American Society of Experimental Neurotherapeutics 2000-2013
- National Neurotrauma Society (co-founder). 1988-Present.

- International Neurotrauma Society (charter member) 1995-Present
- American Society for Neurochemistry 2000-Present

### **PROFESSIONAL SERVICE**

- Scientific Advisory Council, American Paralysis Association. 1984-1989.
- President, National Neurotrauma Society, 2007-2008
- Vice President, National Neurotrauma Society, 1989-1990. 2004-2005
- Secretary/Treasurer, National Neurotrauma Society, 1993-1994; 2002-2003.
- Councillor, National Neurotrauma Society, 1996-1998; 2010-2012
- Scientific Advisory Board, Paralyzed Veterans of America Spinal Cord Research Foundation, 1993-2007; Chairman, 2000-2002
- VA Technology Transfer Advisory Committee, 2003-2004
- NINDS Spinal Muscular Atrophy Project Steering Committee, 2003-2012

### **UPJOHN/PHARMACIA & UPJOHN SERVICE**

- U-74006F or tirilazad mesylate (lazaroid) PPDS Project Team. 1986-1997.
- U-78517F (second generation lazardoid) Pre-PPDS Project Team. 1988-1989, Chairman.
- U-104067F PPDS Project Team. 1994-1996.
- Biology Education Committee. 1987-1989.

### **PARKE-DAVIS SERVICE**

- Institutional Animal Care and Use Committee, 1998-2000
- Team Leader, Neurological Disorders Therapeutic Area Team, 1998-2000
- Team Leader, Pain Therapeutic Area Team, 2000
- Team Leader, Neurorestoration Therapeutic Area Team, 2000-2001
- Team Leader, Neurodegeneration Therapeutic Area Team, 2001-2002

### **UNIVERSITY OF KENTUCKY SERVICE**

- University of Kentucky/Cardinal Hill Rehabilitation Hospital Neurorehabilitation Advisory Board
- Clinical Translational Methodology Committee (CAT-MD)
- UK HealthCare Drug/Vendor Policy Workgroup, 2008
- UK College of Health Science External Review Committee, 2010
- College of Medicine Dean's Search Committee, 2010
- MD/PhD Internal Advisory/Admissions Committee 2010-2012

- Biomedical Sciences Executive Committee (2011-2013)
- Health Care Clinical Sciences Area Advisory Committee (2013-2015)
- Department of Anatomy & Neurobiology Chair Search Committee (2015-2016)
- UK College of Medicine Academic Promotions & Tenure (APT) Committee (2016-?)

## EDITORIAL BOARDS

- Editorial Board, **Central Nervous System Trauma**. 1983-1988.
- Associate Editor, **Journal of Neurotrauma**. 1988-1995.
- Section Editor (Neuropharmacology and Preclinical Investigations), **Journal of Neurotrauma**, 1995-Present
- Editorial Board, **Neurotherapeutics**, 2002-Present
- Editorial Board, **Biochemical Pharmacology**, 2006-2010
- Editorial Board, **Journal of Cerebral Blood Flow & Metabolism**. 2008-2011
- International Editorial Board, **The Indian Journal of Neurotrauma**. 2013-Present
- Editorial Board, **Alzheimer's Disease & Dementia**. 2017-Present

## FEDERAL GRANT REVIEW EXPERIENCE

- VA Merit Review Board-Neurobiology C- October, 2002-2005 (Chairman, 2003-2005)
- NICHD Ad Hoc study section: Pharmacological Approaches to Enhance Neuromodulation in Rehabilitation, March 14, 2003
- Spinal Cord Injury Special Emphasis Panel, April 2, 2004.
- Ad Hoc member of NINDS BDCN-1 (CND) Study Section, February, June, 2004
- Regular Member of NINDS CND Study Section, October, 2004 – June, 2008
- Chair, NINDS CND Study Section, October, 2007-June, 2008
- Chair, ZRG1 BDCN-Y Member Conflict Study Section, October, 2007
- Chair, ZRG1 BDCN-J (03) Member Conflict Study Section, May, 2008
- NINDS Spinal Muscular Atrophy Project Steering Committee, September, 2003-Present
- Ad Hoc member of NINDS CNNT Study Section, September, 2008
- Chair, Deployment Related Medical Research Program-ATTDA Medical Device Review Panel, December, 2008.
- Ad Hoc member of NINDS ANIE Study Section, February, 2009
- Chair, Neurotrauma Program Review Team, Walter Reed Army Institute for Research, February, 2009
- Regular Member, NINDS NSD-A Study Section, October, 2009-2015
- Ad Hoc Member, NINDS BINP Study Section, June, 2009-present

## CONSULTANTSHIPS

- Geron Corporation, 2003-2004 - development of neural stem cell transplantation for spinal cord injury
- Remedy Pharmaceuticals, 2007-present - development of novel compounds for acute stroke and CNS injury
- Asubio Pharmaceuticals, 2007-2008 – development of novel compound for acute spinal cord injury
- NeuroOp, Inc., 2008-present – development of novel drugs for CNS injury and stroke
- Centre for Neuroskills (Bakersfield, CA), 2009-2013 – serve on Advisory Board and consult on pharmacological issues related to neurorehabilitation after traumatic brain injury
- BioMarin Pharmaceutical Inc (Novato, CA), 2013 to 2014 – development of novel drugs for spinal cord injury

## MANAGEMENT COURSES

- Upjohn Career Development Workshop, 1986
- Seven Habits of Highly Effective People (S. Covey Course), 1997
- Univ. of Michigan Business School Management I Course, 1999
- Univ. of Michigan Business School Management II Course, 2001

## CURRENT EXTRAMURAL GRANT FUNDING

**1R01 NS083405-01A1**

**Hall (PI)**

**07/01/2013-6/30/2018**

**Multi-Mechanism Inhibition of Lipid Peroxidation in TBI**

**Total Direct Costs: \$1,093,750**

Goal: This project will examine the potentially greater benefits that might be obtained in the rat controlled cortical impact traumatic brain injury model when multiple neuroprotective compounds that target oxidative secondary injury mechanisms are administered together. Specifically, we will test a combination multi-mechanistic antioxidant treatment strategy combining two or three of the following mechanistically complimentary antioxidant compounds: 1) the lipid peroxidation-inhibiting drug U-83836E, 2) the commercially available compound phenelzine that scavenges the neurotoxic lipid peroxidation-derived lipid aldehyde 4-hydroxynonenal (4-HNE) and 3) the extensively demonstrated mitochondrial protective compound cyclosporine A.

**1R01 NS084857-01A1**

**Hall (PI)**

**02/01/2014-01/31/2018 (currently**

**on No Cost Extension to 07/31/2018)**

**Carbonyl Scavenging for Traumatic Brain Injury**

**Total Direct Costs: \$875,000**

Goal: This project will examine the neuroprotective effects of phenelzine, a long-used anti-depressant compound that has recently been discovered to also be a scavenger of lipid peroxidation-derived carbonyl-containing aldehydes such as 4-hydroxynonenal and acrolein, in the rat controlled cortical impact traumatic brain injury model (CCI-TBI). Preliminary data has demonstrated that phenelzine can protect brain mitochondria from impairment of their function, an effect that is correlated with a lessened 4-hydroxynonenal modification of mitochondrial proteins, and to decrease post-TBI brain damage. This proposal will expand our understanding of the neuroprotective pharmacology (e.g. mechanism of action, dose-response and therapeutic window) of phenelzine's "carbonyl scavenging" in terms of neuronal mitochondrial and cytoskeletal protection along with the

ability to improve chronic motor and cognitive recovery and to decrease post-traumatic neurodegeneration.

**1R01 NS100093-01 Hall (PI) 08/15/2016-05/31/2021**  
**Nrf2-Antioxidant Response Element Neuroprotection in TBI Total Direct Costs:**  
**\$1,093,750**

Goal: This project will test the hypothesis that activation of the transcription factor Nrf2 (Nuclear factor E2-related factor) which interacts with the antioxidant response element (ARE) of various cytoprotective and free radical detoxifying genes is a potential pleiotropic therapeutic pathway for acute neurological injury. Using the potent Nrf2-ARE activating compound carnosic acid, we will use a careful pharmacological experimental design to examine the efficacy of that compound in mouse models of focal and diffuse traumatic brain injury (TBI). Multiple endpoints will be employed in both male and female mice including inhibition of lipid peroxidative damage, preservation of mitochondrial function and protection of intracellular calcium homeostasis followed by assessments of improvement in motor and cognitive recovery and decreased neurodegeneration.

**Kentucky Spinal Cord & Head Injury Research Trust Grant #14-4A Hall (PI) 01/14-2015-1/13/2018 (currently on No Cost Extension to 7/13/2018)**

**Oxidative Damage and Calcium-Activated Proteolytic Biomarkers After Traumatic Brain Injury and Effects of Cyclosporine A**  
**Total Direct Costs:**  
**\$270,000**

Goal: Conduct phase II study of the effects of cyclosporine A treatment on critical care Therapeutic Intensity Level and levels of plasma oxidative and proteolytic damage in severe TBI patients.

**1T32 NS077889-01 Hall (PI) 07/01/2017-06/30/2022**  
**Neurobiology of CNS Injury & Repair Training Grant Total Direct Costs \$718,440**

Goal: Supports graduate students who are interested in careers in neurotrauma research.

**1F30 NS096876-01A1 Kulbe (PI); Hall (Sponsor) 07/01/2016-05/31/2020**  
**Multi-Mechanistic Protection of Mitochondria Following TBI Total Direct Costs**  
**\$165,374**

Goal: Traumatic brain injury (TBI) represents a significant health crisis and affects millions of people worldwide. Currently there are no approved pharmacotherapies for the clinical treatment of TBI. This NRSA predoctoral fellowship project combines two FDA approved drugs, phenelzine and cyclosporine A, to protect synaptic and non-synaptic mitochondria, prevent neuronal damage, and improve motor and cognitive function following experimental TBI.

**1R01 NS091582-01 Gensel (PI); Hall (Co-I) 09/30/2015-07/31/2020**  
**The role of macrophage phenotype and age in spinal cord injury Total Direct Costs**  
**\$1,093,750**

## RESEARCH CERTIFICATION

University of Kentucky Collaborative Institutional Training Initiative (CITI), Completion Certificate for Human Research, Expiration: 07/14/2019

Drug Enforcement Agency Controlled Substance Registration, Certificate RH0291473, Expiration: 10/31/2017

## **COMPLETED EXTRAMURAL FUNDING**

### **NEOUCOM (1979-1982)**

NIH-NIMH R03 MH031887; "Depression: Steroids, Monoamines and Synaptic Function"

Role: PI

5/1/79-4/30/80; Total Direct Costs \$5,000

NIH-NIMH R01 MH34111; "Affective Disorders: Glucocorticoids and Synaptic Function"

Role: PI

4/1/80-3/31/83: Total Direct Costs \$108,135 (turned back last year of funding to NIMH when I moved to The Upjohn Company in 10/82)

### **UNIVERSITY OF KENTUCKY (2002-Present)**

Kentucky Spinal Cord & Head Injury Research Trust Grant #3-4A "Novel Pharmacotherapy for Traumatic Brain Injury"

1/1/04-12/31/06, Total Direct Costs: \$270,000

Role: PI

NIH-NINDS 5R01 NS46566; "Peroxynitrite-Induced Oxidative Damage in TBI"

Role: PI

2/1/04-1/31/08; Total Direct Costs \$925,000 (No Cost Extension to 1/31/09)

NIH-NINDS 1 P30 NS051220-01; "UK Spinal Cord & Brain Injury Research Center Core Grant"

Role: PI

5/1/05-4/30/10; Total Direct Costs \$2,224,546

NIH-NINDS 5P30 NS051220-06; "UK Spinal Cord & Brain Injury Research Center Core Grant"

Role: PI

12/01/2010-11/30/2015 ; Total Direct Costs: \$2,432,043

Kentucky Spinal Cord & Head Injury Research Trust Grant #6-5 "Antioxidant/Calpain Inhibitor Combination Strategy in Acute SCI"

Role: PI

1/1/07-12/31/09, Total Direct Costs \$271,606

NIH/NINDS 1R41 NS061459-01 " Novel Neuroprotectants for TBI"

Role: PI

02/15/08-07/31/10, Total Direct Costs \$128,100

NIH/NINDS 1U01 NS066915 "NIM811 for the Treatment of Acute Spinal Cord Injury"

Role: Co-Investigator (5% effort)

2/1/10-1/30/2011 Failed to make first milestone due to inadequate efficacy

NIH/NIDA 1T32 DA022738 "Therapeutic Strategies for Neurodegeneration Training Grant"

9/26/06-6/30/12, Total Direct Costs \$1,240,734

Role: P.I. and Program Director

Kentucky Spinal Cord & Head Injury Research Trust Grant #9-4, "Dual Mechanism Inhibition of Lipid Peroxidation in Acute SCI" Received top score out of 20 grants submitted from UK and UL



Role: PI  
1/15/10-1/14/11 (1 year No Cost Extension to 1/14/2012)  
Total Direct Costs \$99,899

NIH/NINDS 1P01 NS058484-01 "Calpain as a Therapeutic Target for TBI" (J. Geddes, PI)  
05/01/07-04/30/13 (No Cost Extension).  
Role: Project Director, Project 2: "Newer Small Molecule Calpain Inhibitors for TBI" Total Direct  
Costs \$634,257

NIH/NINDS 3P01 NS058484-03SI "ARRA: Calpain as a Therapeutic Target in TBI"  
Role: PI, Project 2  
7/20/09-8/31/11  
Total Direct Costs: \$73,894

NIH-NINDS 1R21 NS077434-01      Inhibition of Lipid Peroxidation in SCI"  
Role: PI  
9/16/2011-08/31/2013  
Total Direct Costs: \$275,000

#### **Ph.D. STUDENTS TRAINED**

Ying Deng, 2003-2007; Ph.D, July, 2007→ Postdoctoral fellow, UCLA Brain Injury Research Center  
(2007-2010); Walter Reed Army Institute for Research (2010-2013), Senior Scientist, GS-13 (2014-  
Present)

Lamin Han Mbye, 2004-2008; Ph.D., April, 2008→ Postdoctoral fellow, Harvard Univ. Medical School  
(2008-2010); Baylor College of Medicine (2011-2014), Instructor in Neurosurgery (2014-Present)

Yiqin Xiong, 2004-2008; Ph.D., July, 2008→ postdoctoral fellow, Stanford Univ Medical School (2008-  
2014), Research Associate (2014-Present)

Ayman Mustafa, 2005-2010; Ph.D., April, 2010→ Assistant Professor, Jordan Univ of Health Sciences  
(2010-present)

John E. Cebak, 2011-2015; Ph.D., July, 2015→ Lincoln Memorial University DeBusk College of  
Osteopathic Medicine, Harrowgate, TN (2015-Present)

Darren Miller, 2009-??

Jacqueline Renee Kulbe, 2015-??; MD-PhD student

Jacob Dunkerson, 2017-??

#### **Ph.D. STUDENT COMMITTEES SERVED ON**

Vidya Nukala, Ph.D., 2007

Matthew Garcia, Ph.D., 2007

Laurie Davis, Ph.D., 2008

Lesley Gilmer, Ph.D., 2009

Andrew Sauerbeck, Ph.D., 2010

Ryan Readnower, Ph.D. 2011

Dexter Reneer, Ph.D., 2012

Shawn Carlson, Ph.D. 2013

Kathleen Schoch, Ph.D. 2013

Rachel Rowe, Ph.D., 2013

Ranjana Singh, Ph.D., 2014

Dustin Brown, Ph.D., 2015

Carolyn Crowdus, Ph.D., 2015

Heather Yonutas, Ph.D., 2015

Murli Mishra, Ph.D., 2016

Katie Guell Salmeron, Ph.D.2018

Danielle Edwards, Ph.D. candidate

Timothy Kopper, Ph.D. candidate

Lydia Hager, Ph.D. candidate

#### **POSTDOCTORAL FELLOWS TRAINED**

Jeffery M. Bosken, Ph.D.; 2004-2006 → Senior Scientist III, Hall laboratory (2006-Present)

Stephanie N. Thompson, Ph.D.; 2005-2009→ Research Scientist, Charleston (WV) Area Medical Center

Radhika Vaishnav, Ph.D.; 2007-2010 → Research Assistant Professor of Neurology, Univ. of Louisville (2011-2014); Currently raising her family

Mona C. Bains, Ph.D.; 2010-2012 → Assistant Professor of Physical Therapy, Univ. of the Incarnate Word, San Antonio, TX (2013-Present)

Lesley K. Gilmer, Ph.D.; 2011-2012 → Assistant Professor of Anatomy, AT Still University of Health Sciences; Phoenix, AZ (2013- 2017); currently Co Chair, Department of Anatomy & Physiology and Associate Professor and Anatomist, Rocky Mountain University of Health Professions

Rachel L. Hill, Ph.D.; 2012-2014 → Scientist I, Hall Laboratory (2014-2017); promoted to Scientist II (2017-Present)

## **MOST SIGNIFICANT RESEARCH AND DRUG DISCOVERY ACCOMPLISHMENTS RELATED TO FIELD OF STUDY**

- Demonstration of the ability of high dose glucocorticoid steroid treatment to retard anterograde (Wallerian) degeneration of motor nerves
- Demonstration of the effects of glucocorticoid steroids on CNS excitability and serotonergic and noradrenergic transmission and the possible relationship of these effects to the pathogenesis of depression
- Demonstration of the importance of oxygen radical-induced lipid peroxidation in the pathophysiology of acute traumatic brain and spinal cord injury
- Discovery and development of high dose (antioxidant) methylprednisolone (Solu Medrol<sup>®</sup>) treatment of acute spinal cord injury (now is standard of treatment for human spinal cord injuries, and is approved in most countries)
- Discovery and development of the "lazaroid" non-glucocorticoid 21-aminosteroid tirilazad mesylate (Freedox<sup>®</sup>) for acute neurological injuries (now on market in several countries for aneurysmal subarachnoid hemorrhage)
- Discovery of the 2-methylaminochroman (U78517) and pyrrolopyrimidine (U101033E) neuroprotective antioxidants
- Demonstration of the neuroprotective properties of the D2/D3 agonist pramipexole (Mirapex<sup>®</sup>) on dopaminergic neurons (now on market for Parkinson's disease in most countries)
- Demonstration of gender differences in susceptibility to acute cerebral ischemia and traumatic brain injury
- Demonstration of the neuroprotective properties of kappa opioid agonists (e.g. U-50488, U-62066E) in acute traumatic and ischemic CNS injury models
- Demonstration of the role of the reactive oxygen species peroxynitrite in traumatic brain injury and the neuroprotective efficacy of peroxynitrite scavenging compounds
- Discovery of the neuroprotective effects of lipid aldehyde scavenging in traumatic brain injury

## **NARRATIVE BIOSKETCH**

**Edward D. Hall, Ph.D.**

**William R. Markesbery, M.D. Chair in Neurotrauma Research**

**Professor of Anatomy & Neurobiology, Neurology, Neurosurgery and Physical Medicine & Rehabilitation**

**University of Kentucky Medical Center**

Dr. Hall, a native of the Cleveland, Ohio area, received his B.S. in biology from Mount Union College in 1972 and his Ph.D. in neuropharmacology from the Cornell University Graduate School of Medical Sciences in 1976. After completing a post-doctoral fellowship at Cornell University Medical College, he joined the Northeastern Ohio Universities College of Medicine where he rose to the rank of Associate Professor of Pharmacology. In 1982, he moved to The Upjohn Company where he initiated and led an effort over many years to discover and develop agents for the treatment of traumatic brain and spinal cord injury and stroke. In 1997, Dr. Hall left Upjohn and joined Parke-Davis Pharmaceutical Research which in 2000 became part of Pfizer Global Research and Development (PGRD). In 2001, he was appointed Senior Director, CNS Pharmacology at PGRD-Ann Arbor. On July 1, 2002, he joined the University of Kentucky Medical Center where he was Director of the Spinal Cord and Brain Injury Research Center (SCoBIRC) until 2012. He currently holds the William Markesbery Chair in Neurotrauma Research and Endowed Professor of Anatomy and Neurobiology, Neurosurgery, Neurology and Physical Medicine & Rehabilitation. Dr. Hall is an authority on the pathophysiology of acute neurological injury, particularly the role of reactive oxygen mechanisms, and the design and development of antioxidant neuroprotective drugs. He played a leading role in the discovery and development of high dose methylprednisolone therapy for acute spinal cord injury. For this work, he received the Upjohn Achievement in Science and Medicine Award in 1991. In 2008, he was elected to the National Spinal Cord Injury Association SCI Hall of Fame. In addition, Dr. Hall was co-discoverer of the 21-aminosteroids ("lazaroids") including tirilazad mesylate which was the subject of phase III clinical trials in moderate and severe TBI and in SCI and was approved for the treatment of aneurysmal subarachnoid hemorrhage in several European and Australasian countries. His ongoing research at the University of Kentucky which is directed at the discovery of novel neuroprotective pharmacological strategies for acute TBI and SCI is funded by the National Institute of Neurological Disorders and Stroke and the Kentucky Spinal Cord & Head Injury Research Trust. Dr. Hall is currently a Section Editor for the Journal of Neurotrauma as well as serving, or having served, on the editorial boards of the Journal of Cerebral Blood Flow & Metabolism, Restorative Neurology and Neuroscience and Biochemical Pharmacology. In addition, he has served as a chair, a regular member or an ad hoc reviewer for several National Institute for Neurological Disorders and Stroke (NINDS) study sections, as Chair of the Veterans Administration Neurobiology C Merit Review Panel and as a member of the Paralyzed Veterans of America Spinal Cord Research Foundation Scientific Advisory Board. He also served as President of the National Neurotrauma Society from 2007-2008.

**Google Scholar H-Index = 82 (1982-2018); 22,968 citations to date; peak citations 2012 (1035); i10 Index = 215 (number of papers with 10 or more citations)**

**Mendelay H-Index = 73 (2006-2018); 16,668 citations to date**

#### **ORIGINAL REFEREED PUBLICATIONS**

1. Hall, E.D., T.Baker and W.F.Riker, Jr. Glucocorticoid preservation of motor nerve function during early degeneration. *Ann. Neurol.* 1:263-270, 1977.
2. Hall, E.D., W.F.Riker, Jr. and T.Baker. Glucocorticoid effects on the responsiveness of normal and degenerating mammalian motor nerve terminals to edrophonium. *Ann. Neurol.* 2:404-408, 1977.
3. Baker, T., W.F.Riker, Jr. and E.D.Hall. The effect of single methylprednisolone dose on motor nerve excitability. *Arch. Neurol.* 34:349-355, 1977.
4. Hall, E.D., T.Baker and W.F.Riker, Jr. Glucocorticoid effects on spinal cord function. *J. Pharmacol. Exp. Ther.* 206:361-370, 1978.
5. Hall, E.D. and T.Baker. Acute effects of intravenous methylprednisolone sodium succinate on spinal reflexes. *Exp. Neurol.* 63:476-484, 1979.
6. Hall, E.D. and T.Baker. Further studies of glucocorticoid effects on spinal cord function: Single and repetitive monosynaptic transmission and apparent Ia transmitter turnover. *J. Pharmacol. Exp. Ther.* 210:112-115, 1979.
7. Hall, E.D. Glucocorticoid enhancement of guanidine neuromuscular facilitation. *Exp. Neurol.* 68:581-588, 1980.
8. Hall, E.D. Glucocorticoid enhancement of serotonergic facilitation of cat spinal monosynaptic motor neuron excitation. *Exp. Neurol.* 68:589-594, 1980.
9. Hall, E.D. Glucocorticoid effects on serotonergic and noradrenergic modulation of spinal monosynaptic transmission. *Psychiat. Res.* 2:241-250, 1980.
10. Hall, E.D. Glucocorticoid modification of the responsiveness of a fast (type 2) neuromuscular system to edrophonium and D-Tubocurarine. *Exp. Neurol.* 69:349-358, 1980.
11. Hall, E.D. Non-serotonergic depression of monosynaptic reflex transmission by D,L-5-hydroxytryptophan. *Neuropharmacology* 20:109-114, 1981.
12. Hall, E.D. and J.M.Braughler. Acute effects of intravenous glucocorticoid pretreatment on the in vitro peroxidation of cat spinal cord tissue. *Exp. Neurol.* 73:321-324, 1981.
13. Braughler, J.M. and E.D.Hall. Acute enhancement of spinal cord synaptosomal (Na<sup>+</sup> and K<sup>+</sup>)-ATPase activity in cats following intravenous methylprednisolone. *Brain Res.* 219:464-469, 1981.
14. Hall, E.D. Glucocorticoid effects on the electrical properties of spinal motor neurons. *Brain Res.* 240:109-116, 1982.
15. Hall, E.D. Acute effects of intravenous glucocorticoid on cat spinal motor neuron electrical properties. *Brain Res.* 240:186-190, 1982.
16. Hall, E.D. and J.M.Braughler. Thyrotropin-releasing hormone for spinal trauma. (Letter), *New Eng. J. Med.* 306:429-430, 1982.
17. McGinley, P.A., J.M.Braughler and E.D. Hall. The determination of methylprednisolone in central nervous tissue and plasma using normal phase high performance liquid chromatography. *J. Chromatog.* 203:29-35, 1982.

18. Hall, E.D. and P.A.McGinley. Effects of a single intravenous glucocorticoid dose on biogenic amine levels in cat lumbar spinal cord. *J. Neurochem.* 38:1787-1790, 1982.
19. Braughler, J.M. and E.D.Hall. Correlation of methylprednisolone levels in cat spinal cord with its effects on spinal lipid peroxidation, (Na<sup>+</sup> + K<sup>+</sup>)-ATPase activity and motor neuron function. *J. Neurosurg.* 56:838-844, 1982.
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#### **PATENTS- Issued**

1. Use of High Doses of Derivatives of 6 $\alpha$ -Methylprednisolone for the Acute Treatment of Stroke Syndrome. U.S. Patent number 4,554,271; November 19, 1985.
2. Inhibition of Angiogenesis Involving the Coadministration of Steroids with Heparin or Heparin Fragments. U.S. Patent number 4,771,042; September 13, 1988.
3. 11 $\alpha$ -Hydroxyl Steroid Diester. U.S. Patent number 4,948,533; August 14, 1990.
4. Pramipexole as a Neuroprotective Agent. U.S. Patent number 5,650,420; July 22, 1997.



### INVITED PRESENTATIONS-SEMINARS AND LECTURES

1. "Pathophysiology, consequence and pharmacological prevention of post-traumatic CNS ischemia," Int'l. Symposium on Processes of Recovery from Neural Trauma. Jerusalem, Israel. June 1984.
2. "Pathophysiology and pharmacological prevention of post-traumatic CNS ischemia," 2nd Neural Trauma Satellite Symposium. Anaheim, CA. October 1984.
3. "A pharmacological analysis of the therapeutic mechanisms and efficacy of high dose methylprednisolone in acute spinal cord injury," Dept. of Anatomy, Univ. of Maryland School of Medicine. October 1985.
4. "Pharmacological intervention in CNS ischemia and trauma: Studies with high dose methylprednisolone," 6th Int'l. Symposium on Intensive Care and Emergency Medicine. Brussels, Belgium. April 1986.
5. "The role of free radical induced lipid peroxidation in post-traumatic spinal cord degeneration," 4th Neural Trauma Satellite Symposium. Washington, DC. November 1986.
6. "Role of oxygen free radical induced lipid peroxidation in acute central nervous system trauma," Oxygen Radicals and Tissue Injury Symposium. Augusta, MI. April 1987.
7. "Mechanisms of progressive CNS hypoperfusion following trauma, subarachnoid hemorrhage and ischemia," 4th World Congress for Microcirculation. Tokyo, Japan. July 1987.
8. "New pharmacological treatments of acute spinal cord injury," 5th Neural Trauma Satellite Symposium. New Orleans, LA. November 1987.
9. "Non-surgical management of spinal cord injuries," and "Beneficial effects of the 21-aminosteroids in acute CNS trauma and hypovolemic shock," 1st Antwerp Int'l. Trauma Symposium. Antwerp, Belgium. November 1987.
10. "Glucocorticoid and non-glucocorticoid steroids: Experimental studies on head and spinal cord injuries," Steroids in CNS Diseases (meeting of the Royal Society of Medicine). London, England. December 1987.
11. "Effects of the 21-aminosteroids, a novel class of anti-oxidants, in experimental cerebral ischemia," Dept. Neurology, Case-Western Reserve School of Medicine. Cleveland, OH. April 7, 1988.
12. "Lazaroids: A new era in chelation therapy," 2nd Annual Martin Rubin lecture on Chelation Therapy, American College for Advancement of Medicine. New Orleans, LA. May 14, 1988.
13. "Protective effects of the 21-aminosteroid U-74006F in models of CNS trauma, ischemia and subarachnoid hemorrhage," Western North Carolina Society for Neuroscience, Bowman Gray School of Medicine. Winston-Salem, NC. August 23, 1988.
14. "Effect of lazaroid U-74006F on CNS trauma and ischemia," Int'l. Resuscitation Research Center. Pittsburgh, PA. September 4, 1988.
15. "21-Aminosteroids: cytoprotective, antioxidant compounds devoid of glucocorticoid actions," Dept. Pharmacology, Univ. Oregon Health Sciences Center, Portland, OR. October 27, 1988.
16. "Role of oxygen radicals in ischemic brain damage: Protective effects of the novel 21-aminosteroid anti-oxidants (lazaroids)," Dept. of Pharmacology and Toxicology, Michigan State University, Lansing, MI. February 28, 1989.

17. "Effects of the 21-aminosteroids (lazaroids) in experimental neuronal injury," Dept. of Pharmacology, Northeastern Ohio Universities College of Medicine, Rootstown, OH. April 6, 1989.
18. "Role of oxygen radicals in stroke: Effects of the 21-aminosteroids (lazaroids), a novel class of antioxidants," Princeton Drug Research Symposium, Current and Future Trends in Anticonvulsant, Anxiety and Stroke Therapy, Princeton, NJ. May 23, 1989.
19. "Beneficial effects of antioxidants in the acute treatment of spinal cord injury," Office of Technology Assessment (U.S. Congress)/Paralyzed Veterans of America Symposium on New Developments in Spinal Cord Injury. Acute Interventions and Neural Grafts, Washington, D.C. June 12, 1989.
20. "Effects of 21-Aminosteroids (lazaroids) on experimental neuronal injury," Dept. of Neurology, University of Medicine and Dentistry of New Jersey, East Orange and New Brunswick, NJ. October 4, 1989.
21. "Lazaroids: Novel membrane anti-oxidants for the treatment of oxygen radical-mediated disorders," Scripps Institute, LaJolla, CA. January 12, 1990.
22. "Steroids and neuronal destruction and stabilization," Ciba Foundation Symposium on Steroids and Neuronal Activity, London, England. January 23, 1990.
23. "21-Aminosteroids: Limiting the extent of damage after ischemia," Royal College of Physicians Symposium on New Pharmacological Strategies for the Prevention and Treatment of Stroke," London, England. January 25, 1990.
24. "Lazaroids - New Drugs to Reduce Ischemic Injury", Western Pharmacology Society. February 27, 1990.
25. "Lazaroids: Novel Antioxidants for the Treatment of Cerebral Ischemia", Henry Ford Hospital, Detroit, MI. March 8, 1990.
26. "The Non-steroidal Lazaroid U78517F in Models of Focal and Global Ischemia", 17th Princeton Conference on Cerebrovascular Diseases, Duke University, Durham, N.C. March 17, 1990.
27. "Role of Free Radicals in Nervous System Injury: Beneficial Effects of Antioxidants", FASEB (APS) Symposium on "The Pharmacological Treatment of Nervous System Trauma", Washington, D.C. April 2, 1990.
28. "The Role of Free Radicals in Neuronal Injury: Experimental Studies With Novel Antioxidants", Dept. of Pharmacology, Cornell University Medical College. May 1, 1990.
29. "Antioxidant Therapy of Brain and Spinal Cord Injury", 7th Neural Injury Conference, University of Virginia, Charlottesville, VA. September 26, 1990.
30. "Role of Oxygen Free Radicals in Cerebral Edema Mechanisms: Rationale for Use of Steroids", International Symposium on Advances in Neuro-oncology, San Remo, Italy. September 28, 1990.
31. "Pharmacologic Rationale for Mega-dose Methylprednisolone Therapy of Spinal Cord Injury", Wakeman Award Symposium, Duke University, Durham, NC. October 26, 1990.
32. "Oxygen Radical-Induced Damage in Central Nervous System Trauma and Ischemia", work session on The Role of Reactive Oxygen Species in Tissue Damage, University of Kansas Medical Center, Kansas City, KS. December 3-4, 1990.
33. "Lazaroids: Novel Antioxidants for the Treatment of Free Radical Disorders", Symposium on Oxidation and Antioxidants, Toronto General Hospital, Ontario. December 12, 1990.

34. "Lazaroid: A Novel Compound for Treatment of Free Radical Diseases", University of Illinois at Chicago Eye Center, Chicago, IL. January 23, 1991.
35. "The Role of Free Radicals in CNS Injury: Potential Therapy with Novel Antioxidants", Neurosurgery Grand Rounds, NYU Medical Center, New York, NY. March 15, 1991.
36. "Lazaroids: Novel Antioxidants for Neuronal Injury and Ischemia", Department of Neurosurgery, Hennepin County Medical Center, Minneapolis, MN. April 11, 1991.
37. "Lipid Peroxidation-Mediated Neuronal Injury", First International Neurotrauma Symposium, Fukushima, Japan. May 15, 1991.
38. "Basic Biological Features of Steroids and Lazaroids: Experimental Data", Danish Society of Neurosurgeons, Copenhagen, Denmark. September 30, 1991.
39. "Pharmacokinetics and Dose-Response Curve in Spinal Cord Injury Research", NIH-Houston Workshop on Experimental Spinal Cord Injury, Houston, TX. October 10, 1991.
40. "Neuroprotectant Effect of Methylprednisolone and the 21-Aminosteroids", Symposium on Neurosteroids and Brain Function (Fidia Research Fndn.), New Orleans, LA. November 8, 1991.
41. "Biochemistry/Pharmacology of Lipid Antioxidants", 9th Neurotrauma Sympostium, New Orleans, LA. November 10, 1991.
42. "Novel Inhibitors of Iron-Dependent CNS Lipid Peroxidation for Neurodegenerative Disorders", Iron Meeting, Univ. S. Florida College of Medicine, Sarasota, FL. November 15, 1991.
43. "Free Radicals in CNS Injury", Assoc. for Research in Nervous and Mental Disorders Symposium on Molecular and Cellular Approaches to the Treatment of Brain Disease, New York, NY. December 6, 1991.
44. "The Effects of Glucocorticoid and Non-Glucocorticoid Steroids on Acute Neuronal Degeneration", 4th Int'l Symposium on Neural Regeneration, Pacific Grove, CA. December 12, 1991.
45. "Neuroprotective Properties of Lipid Antioxidants," IBC Conference on CNS Neuronal Injury: Advances in Drug Research, Philadelphia, PA. February 25, 1992.
46. "Lazaroids: Novel Antioxidants for Treatment of Free Radical Mediated Tissue Injury," Grand Rapids, Dept. of Medicine, Michigan State Univ., East Lansing, MI. March 17, 1992.
47. "Role of Free Radicals in Tissue Injury," 12th International Symposium on Intensive Care and Emergency Medicine, Brussels, Belgium. March 25, 1992.
48. "Place of 21-Aminosteroids in CNS Injury," 12th International Symposium on Intensive Care and Emergency Medicine, Brussels, Belgium. March 26, 1992.
49. "21-Aminosteroids in CNS Injury," Dept. Neurology, Univ. Utrecht, Holland. March 24, 1992.
50. "Role of Methylprednisolone in Non-traumatic Spinal Cord Injury (tumors) and the 21-Aminosteroids," Dept. Neuroradiology, Univ. Nijmegen, Holland. March 25, 1992.
51. "21-Aminosteroids in Spinal Cord Injury," Dept. Neurosurgery, Univ. Bochum, Germany. March 27, 1992.
52. "Lazaroids: New Drugs for Neuroprotection," Symposium on the Brain-Damaged Patient: Recent Advances in Pathogenesis and Treatment, London, U.K. April 27, 1992.
53. "Strategies Which Decrease Post-Reperfusion Lipid Peroxidation," 2nd International Symposium on Thrombolytic Therapy of Stroke, San Diego, CA. May 2, 1992.

54. "Development of Novel Antioxidants for Neurodegenerative Disorders," Canadian College of Neuropsychopharmacology, Saskatoon, Saskatchewan. June 1, 1992.
55. "Lipid Antioxidants, Symposium on Neurotrauma: Concepts, Current Practice and Emerging Therapies, Detroit, MI. June 12, 1992.
56. "The Role of Free Radical Mechanisms in Ischemic Neuronal Injury," satellite symposium on "Cerebral Ischemia - A Clinical Dilemma," XXVIIth Meeting of the Canadian Congress of Neurological Sciences, Winnipeg, Manitoba. June 24, 1992.
57. "Megadose of Corticosteroids in Acute Spinal Cord Injuries," Symposium on Modern Use of Corticosteroids, American college of Clinical Pharmacology, Washington, DC. September 17, 1992.
58. "Role of Oxygen Radicals in Acute Spinal Cord Injury," Knight Lecture, Miami Project, University of Miami School of Medicine, Department of Neurosurgery, Miami, FL. November 4, 1992.
59. "Industry as a Source of Research Support," 18th Joint Conference on Stroke and Cerebral Circulation, Miami Beach, FL. February 11, 1993.
60. "Lazaroids: Potent Inhibitors of Iron-Dependent Lipid Peroxidation for Neurodegenerative Disorders," Workshop on Iron in CNS Disorders, Wurzburg, Germany. March 6, 1993.
61. "Role of Free Radicals in CNS Injury," Seminar at Western Michigan University Biological Sciences Department, Kalamazoo, MI. March 19, 1993.
62. "Antioxidant Therapy and Neuroprotection," Collegium Internationale Neuropsychopharmacologicum, President's Workshop on Recent Advances in the Treatment of Neurodegenerative Disorders and Cognitive Dysfunction, Capri, Italy. May 3, 1993.
63. "Role of Free Radicals in Focal Cerebral Ischemia," Dept. of Neurology, Univ. of Rome, Italy. May 5, 1993.
64. "Lazaroids: Novel Antioxidants for Free Radical-Mediated Neurodegenerative Disorders," International Colloquium on Neuromelanin and Parkinson's Disease, Sorrento, Italy. May 8, 1993.
65. "Inhibition of Lipid Peroxidation in Spinal Cord Injury," Xth International Congress of Neurological Surgery, Acapulco, Mexico. October 21, 1993.
66. "Neuronal Protection with the 21-Aminosteroids: Experimental Data," 47th Congress, Nazionale della Societa Italiana, Anestesia, Analgesia, Reanimazione e Terapia Intensiva, Florence, Italy. October 27, 1993.
67. "Generation and Defection of Hydroxyl Radical in Experimental Head Injury," Second International Symposium on Reactive Oxygen Species: Neurobiology of NO<sup>•</sup> and <sup>•</sup>OH, NIH, Bethesda, MD. November 7, 1993.
68. "Tirilazad Mesylate: Antioxidant Mechanisms and Neuroprotection," Second International Symposium on Reactive Oxygen Species: Neurobiology of NO<sup>•</sup> and <sup>•</sup>OH, NIH, Bethesda, MD. November 76, 1993.
69. "Potential for Anti-Free Radical Therapies in Motor Neuron Disease," Fourth International Symposium on ALS/MND, Chantilly, France. November 26, 1993.
70. "Mechanisms of Cell Death in CNS Diseases or Injuries." Departments of Neurology and Neurosurgery, University of Bordeaux, Bordeaux, France. November 25, 1993.
71. "Ischemic Neuronal Injury," Montreal-Cleveland-Yale Cerebrovascular Symposium on Giant Intracranial Aneurysms, Montreal, Quebec. December 3, 1993.

72. "Role of Free Radicals in Cerebral Ischemia," The Banff Conference - Alberta Stroke Program, Banff, Alberta. December 10, 1993.
73. "21-Aminosteroids Modify Brain Injuries," Second International Neurointensive Care Conference, Beaver Creek, CO. February 14, 1994.
74. "Pharmacology of the Lazaroids," Spring Brain Conference, Orlando, FL. March 26, 1994.
75. "Oxygen Free Radicals and Secondary Tissue Damage," 7th Annual Trauma, Anesthesia and Critical Care Symposium, Paris, France. April 23, 1994.
76. "The Evolution of a Clinical Trial," Society for Academic Emergency Medicine, Washington, DC. May 9, 1994.
77. "Free Radical Scavengers in the Early Treatment of Stroke," National Foundation for Brain Research 5th Annual Decade of the Brain Symposium, Washington, DC. May 10, 1994.
78. "Development of Tirilazad Mesylate (Freedox) for SAH," Symposium on New Trends in the Treatment of Neurotrauma, 7th European Congress on Intensive Care Medicine, Innsbruck, Austria. June 16, 1994.
79. "Lazaroids: Neuroprotective Antioxidant Mechanisms," Symposium on Prospects for Neuroprotection and Neurorescue by Selective Monoamine Oxidase Inhibitors and Antioxidants, 12th International Congress of Pharmacology, Montreal, Canada. July 26, 1994.
80. "Effects of Lipid Antioxidants on Motor Neuronal Degeneration," Symposium on Superoxide Dismutase and Free Radicals in ALS and Neurodegeneration, Lake Bluff, IL. September 11, 1994.
81. "Iron-Catalyzed Lipid Peroxidation in CNS Tissue: Inhibition of Lipid Peroxidation in Trauma and Ischemia," Satellite Symposium on Normal and Pathological Brain Iron (International Congress of Neuropathology), Niagara Falls, NY. September 18, 1994.
82. "Free Radical Scavengers in Stroke and Subarachnoid Hemorrhage," Symposium on Acute Brain Attack: Management of Stroke in the 90s, American Heart Association of Michigan, Ann Arbor, MI. October 2, 1994.
83. "Free Radicals, Antioxidants, in ALS," Current Concepts and Management of ALS, Bronson Neurosciences, Kalamazoo, MI. October 12, 1994. 84. "Age-Related Changes in Hydroxyl Radical Stress, Antioxidants and Lipid Peroxidation in Brain," Symposium on Industrial Initiatives in Antioxidant Interventions, American Aging Association, 24th Annual Meeting, Washington, DC. October 15, 1994.
85. "Secondary Tissue Injury in CNS: An Overview of Mechanisms," 2nd International Symposium on Severe Head Injury, Parma, Italy. October 17, 1994.
86. "Experimental and Clinical Experience with the Lipid Peroxidation Inhibitor Tirilazad Mesylate in Ischemic Stroke and Subarachnoid Hemorrhage," Neurosurgery/Neurology Grand Rounds, University of Ottawa (Ottawa General Hospital), Ottawa, Ontario, Canada. October 28, 1994.
87. "Neuroprotective Efficacy of Microvascularly Localized Versus Brain-penetrating Antioxidants," Vth International Symposium on Mechanisms of Secondary Brain Damage, Muls, Italy. February 23, 1995.
88. "Secondary Tissue Injury in the CNS: An Overview of Mechanisms," European Society of Anaesthesiologists, Paris, France. May 2, 1995.
89. "Neuroprotective Pharmacology and Mechanism of Action of Tirilazad Mesylate," Swiss Congress of Neurosurgery, Basel, Switzerland. May 4, 1995.

90. "Neuroprotective Pharmacology and Mechanism of Action of Tirilazad Mesylate," 10th European Congress of Neurological Surgery, Berlin, Germany. May 8, 1995.
91. "Novel Brain-penetrating Antioxidants for the Treatment of Acute and Chronic Neurodegenerative Disorders," XVth Spring International Symposium "Neurodegenerative Diseases '95: Molecular and Cellular Mechanisms and Therapeutic Advances", Washington, D.C. May 17, 1995.
92. "Free Radical Scavengers", Keynote lecture at 4th International Workshop on Cerebrorassular Surgery, Chicago, Illinois. June 13, 1995.
93. "Role of Oxygen Radicals in Ischemic Stroke", Symposium on "Cellular Mechanisms involved in Brain Ischemic", The Saskatchewan Stroke Research Centre, Saskatoon, Saskatchewan. June 17, 1995.
94. "Cellular Secondary Injury Mechanisms: Spinal Cord Injury", Plenary Lecture at 3rd International Neurotrauma Symposium, Toronto, Ontario. July 25, 1995.
95. "Effect of Lipid Peroxidation Inhibitors on Apoptotic Neuronal Degeneration", International Symposium on Oxidative Stress, Apoptosis and Brain Damage, Allegheny General Hospital, Pittsburgh, PA. September 24, 1995.
96. "Free Radicals and Membrane Integrity in Traumatic Brain Injury", Acute CNS Injury Conference, Medical College of Virginia/Virginia Commonwealth University, Williamsburg, VA. September 29, 1995.
97. "Lazaroids and Neurodegenerative Disease", Department of Pharmacology, University of Hawaii School of Medicine, Honolulu, Hawaii, January 9, 1996.
98. "Role of Oxygen Radicals in Acute Stroke: Novel Antioxidants for Attenuation of Neuronal Damage", Department of Neurosciences, University of Hawaii School of Medicine, Honolulu, Hawaii, January 9, 1996.
99. "Life of a Scientist in Industry", Graduate Program, Northeastern Ohio Universities College of Medicine, Rootstown, Ohio, February 13, 1996.
100. "Further Studies on the Efficacy of the Cytoprotective Lipid Peroxidation Inhibitor Tirilazad in Experimental Models of Brain Injury and SAH", International Conference on Recent Advances in Neurotraumatology", Rimini, Italy, September 9, 1996.
101. "Pyrrolopyrimidines: Novel Brain-Penetrating Antioxidants in Focal and Global Ischemia" and "Neuroprotective Properties of the Benzodiazepine Receptor Partial Agonist U-101017 in the Gerbil Forebrain Ischemia Model", 3rd International Conference on Neuroprotective Agents: Clinical and Experimental Aspects, Varenna, Italy, September 11 and 12, 1996.
102. "Present and Future Pharmacological Strategies for Acute Spinal Cord Injury", Spinal Cord Research Symposium, 20th Anniversary of the Paralyzed Veterans of America Spinal Cord Research Foundation, Washington, D.C., December 12, 1996.
103. "Oxygen Radical Damage and Therapeutic Strategies in Transgenic Familial ALS Mice", Mini-symposium on Oxidative Stress and the Nervous System sponsored by the Neurodegenerative Diseases Research Centre & International Antioxidant Research Centre, Kings College, London, January 15, 1997.
104. "The Lazaroids", IBC Conference on Free Radicals: Prospects for Therapeutic Strategies, London, U.K., January 17, 1997.

105. "Oxygen Radical Damage and Therapeutic Strategies in Transgenic Familial ALS Mice", Scientific Education Partnership/ALS Association symposium on Neurodegenerative Diseases, Free Radicals and Programmed Cell Death, Kansas City, MO, January 22, 1997.
106. "Role of Oxygen Radicals in Neural Injury", Department of Biomedical Engineering, Case Western Reserve University, Cleveland, Ohio, April 22, 1997.
107. "Tirilazad Mesylate in SAH: Preclinical Data-Predictor of Efficacy?", 6th International Conference on Cerebral Vasospasm, Sydney, Australia, May 13, 1997.
108. "Neuroprotection", Plenary Lecture at the 16th World Congress of Neurology, Buenos Aires, Argentina, September 18, 1997.
109. "Novel Antioxidants for treatment of Neurodegenerative Diseases," Presidential Symposium on Free Radical Biology and Otolaryngology, Association for Research in Otolaryngology, St. Petersburg, Florida, February 15, 1998.
110. "Pyrrolopyrimidines: novel brain-penetrating antioxidants with neuroprotective activity in acute and chronic neurodegeneration models", Workshop on Novel Strategies Against Neurodegeneration: Role of Antioxidants, American Society for Neurochemistry, Denver, Colorado, March 10, 1998.
111. "Targeting Free Radicals in Stroke, Trauma and Neurodegenerative Disease", Keystone Symposium on Effectors of Inflammation in the CNS, Taos, New Mexico, March 13, 1999.
112. "Role of Reactive Oxygen Species and Antioxidant Therapy in Acute CNS Trauma and Stroke", Virginia Chapter of Neuroscience Society Annual Symposium on Oxidative Stress and Brain Pathology, Richmond, Virginia, April 29, 1999.
113. "Peroxynitrite Scavengers for the Acute Treatment of Traumatic and Ischemic CNS Injury", 2<sup>nd</sup> International Symposium on the Biology and Chemistry of Peroxynitrite, Crete, Greece, May 21, 1999.
114. "Reactive Oxygen-Mediated Neuroinflammatory Mechanisms", 4<sup>th</sup> International Symposium on Medicinal Chemistry of Neurodegenerative Diseases, Cancun, Mexico, February 1, 2000.
115. "Mechanisms of Reactive Oxygen Damage and Antioxidant Therapy in Acute and Chronic Neurodegenerative Disease", (Plenary Speaker) 6<sup>th</sup> Symposium on Neurodegenerative Disorders: Common Molecular Mechanisms, Tobago, April 9, 2000
116. "Pharmacological Treatment of Acute Spinal Cord Injury: How Do We Build on Past Success?" Donald Munro Memorial Lecture, American Paraplegia Society, Las Vegas, NV, September 6, 2000.
117. "Animal Data Applicable to the Design of Phase II Dose-Response Trials", workshop on Design of Phase II Dose-Response Trials in Neuroscience, American Society for Experimental Neurotherapeutics, Washington, D.C., March 17, 2001.
118. "Patents and Collaborations: The Perspective of Big Pharma", Conference on " Intellectual Property in the VA: Changes, Challenges & Collaborations", Arlington, VA; April 12, 2001.
119. "Drug Discovery for Acute CNS Injury: How Do We Build on Past Success", University of Kentucky Spinal Cord and Brain Injury Center, Lexington, KY: May 1, 2001.
120. "Drug Discovery for Acute Neuroprotection 1980-2000: Success and Failure" Advanced Technology Applications for Combat Casualty Care (ATACCC 2001 Conference, Fort Walton Beach, Florida, September 11, 2001.

121. "Drug Discovery for Acute Neuroprotection: How Do We Build on Past Success" Advanced Technology Applications for Combat Casualty Care (ATACCC 2001 Conference, Fort Walton Beach, Florida, September 11, 2001.
122. " Future Trends in Neuroprotective Strategies", plenary lecture at Neuroprotection Symposium at Kaohsiung Hospital, Kaohsiung, Taiwan; November 3, 2001.
123. "From Synthesis to First in Humans: Pharmacology & Chemistry", workshop on Proof of Concept Trials in Neuroscience, American Society for Experimental Neurotherapeutics, Washington, D.C., March 15, 2002.
124. "Pharmacological Treatment of Acute CNS Injury: What Have We Accomplished and Where Do We Go From Here?", 8<sup>th</sup> Annual Kentucky Spinal Cord and Head Injury Research Symposium, Lexington, KY June 24, 2002.
125. "Reactive Oxygen Mechanisms in Secondary Brain and Spinal Cord Injury and Antioxidant Strategies", Cambridge Centre for Brain Repair Spring School, Cambridge University, U.K., March 25, 2003.
126. " Drug Development in Spinal Cord Injury: What is the FDA Looking For?" American Spinal Cord Injury Association, Miami, Florida, April 3, 2003.
127. "Pathophysiology of Spinal Cord Injury", Symposium on Cellule Staminal e Lesione Midollare: Tra Futuro E Realta (Stem Cell Therapy for Spinal Cord Injury: Present and Future)", Niguardo Hospital, Milan, Italy, May 10, 2003.
128. "Brain and Spinal Cord Injuries: Devastating, but Potentially Treatable Conditions", Biology Symposium during Bracy Hall dedication, Mount Union College, Alliance, Ohio, October 17, 2003.
129. "Integration of Reactive Oxygen and Calpain-Mediated Cytoskeletal Damage Mechanisms in Traumatic Brain Injury", Kentucky Spinal Cord Injury Research Center, Louisville, KY, January 18, 2004.
130. "Calpain-Mediated Cytoskeletal Damage in Traumatic Brain Injury: Neuroprotective Effects of Indirect Calpain Inhibition", Medical University of South Carolina, Charleston, SC, March 11, 2004.
131. "Peroxynitrite-Mediated Oxidative Damage in Models of Diffuse and Focal Traumatic Brain Injury", 4<sup>th</sup> International Conference on Peroxynitrite and Reactive Nitrogen Species, Konstanz, Germany, July 30, 2004.
132. "Gender Differences in Diffuse and Focal TBI in Mice", 7<sup>th</sup> International Neurotrauma Symposium, Adelaide, Australia, September 16, 2004.
133. "Newer Concepts of Oxidative Damage Mechanisms and Antioxidant Approaches for Acute CNS Injury", Colloquium in Neuroscience, University of Texas-Houston, Houston, TX, June 2, 2005.
134. "Current Concepts of Oxidative Damage and Antioxidant Neuroprotection in Acute CNS Injury", Plenary Lecture at Rachidian Society Meeting, Kailua-Kona, Hawaii, February 6, 2006.
135. "Role of Peroxynitrite in Secondary Damage in Traumatic Brain and Spinal Cord Injury", Seminar, Medical College of Virginia; Richmond, VA April 12, 2006.
136. "Pathophysiology of Traumatic Brain Injury: Opportunities for Pharmacological Neuroprotection" and "Pathophysiology of Traumatic Spinal Cord Injury: Opportunities for Pharmacological Neuroprotection", University of Alaska-Fairbanks; Fairbanks, Alaska, August 28, 2006.



137. "Rationale for Combining an Antioxidant With Other Neuroprotective Strategies", University of California Neurotrauma Meeting, Santa Barbara, CA, September 24, 2007.
138. "Growth Across the Glial Scar Will be Sufficient for Functional Recovery" (Debate Participant), International Symposium on Neural Regeneration, Pacific Grove, CA, December 7, 2007.
139. "Discovery of Therapies for Neurodegenerative Disease: Academia to Industry and Back Again". University of Kentucky Clinical and Translational Science Seminar, Lexington, KY December 12, 2007.
140. "The Rationale for Combination Therapies for Traumatic Brain Injury", University of Kansas Medical Center, Kansas City, KS January 16, 2008.
141. "The Rationale for Combination Therapies for Traumatic Brain Injury", Seminar, Medical College of Virginia; Richmond, VA April 23, 2008.
142. "The Development, Growth and Organization of Neurotrauma Research in Kentucky", Medical University of South Carolina, Charleston, SC May 30, 2008
143. "Is Interruption of Oxidative Damage Alone Enough to Achieve Clinically Meaningful Neuroprotection?" 26<sup>th</sup> National Neurotrauma Symposium; Lake Buena Vista, FL July 29, 2008.
144. "Newer Concepts Concerning the Role of Oxidative Damage and Its Treatment in Acute CNS Injury", Gail F. Beach Memorial Visiting Lecture, Miami Project to Cure Paralysis, University of Miami-Miller School of Medicine; Miami, FL December 3, 2008.
145. "Newer Concepts Concerning the Role of Oxidative Damage and Its Treatment in Acute CNS Injury", University of Kentucky Neurology Grand Rounds; Lexington, KY June 2, 2009.
146. "Newer Concepts Concerning the Role of Oxidative Damage and Its Treatment in Acute CNS Injury", Indiana University School of Medicine, Stark Neurosciences Research Institute seminar; Indianapolis, IN October 29, 2009.
147. "Pharmacology of Antioxidant Therapies for Traumatic Brain Injury", 10<sup>th</sup> Annual California Brain Injury Association Neuroscience of Brain Injury: Research Informing Medical Treatment and Legal Practice, Napa, CA November 20, 2009.
148. "Future Neuroprotective Strategies for Acute CNS Injury", Loyola University Medical Center Burn, Shock and Trauma Institute, Maywood, ILL. March 31, 2010.
149. "State of the State: Brain Injury Research and Education", 21<sup>st</sup> Annual Brain Injury Summit (Brain Injury Alliance of Kentucky-BIAK), Cardinal Hill Hospital, Lexington, KY. April 9, 2010.
150. "Toward a More Effective Approach for Inhibiting Oxidative Damage in Traumatic Brain Injury", Emory Neurosciences Symposium "Therapeutic Frontiers in Acute CNS Injury", Emory University, Atlanta, GA, May 7, 2010.
151. "Mitochondrial Protection as a Therapeutic Strategy for Acute CNS Injury", Northeastern Ohio Universities Colleges of Medicine and Pharmacy, Rootstown, OH. May 21, 2010.
152. "Targeting Oxidative Stress in Spinal Cord Injury", Invited lecture at 28<sup>th</sup> National Neurotrauma Symposium; Las Vegas, NV. June 17, 2010.
153. "Overview of Therapeutics for TBI", Institute of Medicine of the National Academies Committee on Nutrition, Trauma and the Brain, Workshop on Nutrition and Neuroprotection in Military Personnel, Washington, DC. June 24, 2010.
154. "Update on Experimental Approaches for Single and Combination Neuroprotective Therapy of Acute CNS Injury", University of Kentucky Department of Neurology Grand Rounds, Lexington, KY, September 21, 2010.

155. "Summary and Overview Towards Funding Opportunities in TBI Research" Wayne State University Traumatic Brain Injury Workshop, Detroit, MI, November 12, 2010.
156. "Overview of Spinal Cord & Brain Injury and Research Initiatives at the University of Kentucky Spinal Cord & Brain Injury Research Center", Jockeys' Guild Annual Assembly, Tucson, AZ, December 6, 2010.
157. "Role of Oxidative Stress Mechanisms and Potential Effects of Antioxidant Drugs and Nutraceuticals on Acute and Chronic Post-TBI Neurological Recovery", 3<sup>rd</sup> Federal Interagency Conference on Traumatic Brain Injury, Washington, D.C., June 15, 2011.
158. "Future of Neuroprotective Drug Discovery for TBI and SCI", University of Kentucky Neuroscience Symposium, Lexington, KY, November 19, 2011.
159. "Future of Antioxidant Therapy for TBI" Albert Einstein College of Medicine Department of Neurology Grand Rounds, New York, N.Y. December 15, 2011.
160. "Oxidative Damage Mechanisms and Antioxidant Neuroprotection in Traumatic Brain Injury" Georgetown University School of Medicine, Washington, DC, April 17, 2012.
161. "Oxidative Damage Mechanisms and Antioxidant Neuroprotection in Traumatic Brain Injury", Medical College of Georgia, Department of Neurosurgery, August, GA, April 25, 2012.
162. "Oxidative Damage Mechanisms and Pharmacological Treatment Approaches in TBI", Northeast Ohio Medical University, Rootstown, OH April 27, 2012.
163. "Carbonyl Scavenging as a Novel Antioxidant Neuroprotective Approach for Traumatic Brain Injury", 6<sup>th</sup> Pannonian Symposium on Central Nervous System Injury, Pecs, Hungary, April 6, 2013.
164. "Pursuit of Diagnostic and Therapeutic Plasma/CSF Biomarkers for Traumatic Brain Injury". UK Neurosurgery Grand Rounds, Lexington, KY October 3, 2013.
165. "The Therapeutic Windows for Inhibiting Post-TBI Secondary Injury are Similar in Animals and Man". 11<sup>th</sup> International Neurotrauma Symposium, Budapest, Hungary, March 22, 2014.
166. Invited Thought Leader for Joyce Massey TBI Summit I, University of Michigan, Ann Arbor, MI September 25, 2015.
167. "Carbonyl Scavenging as a Neuroprotective Approach for TBI", Plenary lecture at the 12<sup>th</sup> International Neurotrauma Symposium; Capetown, South Africa, February 2, 2016.
168. "Pathophysiology of Traumatic Brain Injury: Oxidative Damage", Sunrise Seminar at the 12<sup>th</sup> International Neurotrauma Symposium; Capetown, South Africa, February, 3, 2016.
169. "Pathophysiology and Treatment of Oxidative Stress in CNS Injury", 6<sup>th</sup> Annual Meeting of the Puerto Rico Physiological Society, University of Puerto Rico, San Juan, Puerto Rico, February 12, 2016.
170. "Newer Concepts of Posttraumatic Oxidative Damage and Antioxidant Neuroprotective Strategies", 2<sup>nd</sup> Signature Center Initiative Retreat-Center for Spinal Cord and Brain Injury Research; Indianapolis, IN October 15, 2016.
171. "Can We Really Protect the Injured Brain and Improve Post Traumatic Brain Injury Neurological Recovery?", Wright State University School of Medicine, Department of Pharmacology Seminar, Dayton, OH April 12, 2017.
172. "Newer Approaches for Pharmacological Antioxidant Neuroprotection in CNS Injury", Temple University-Shriners Hospital Pediatric Research Center, Philadelphia, PA June 20, 2017.

173. "What Will it Take to Achieve an Improvement in Post-TBI Neurological Recovery?- Perspectives of a Neuroprotectionist", Keynote Speaker at National Neurotrauma Symposium, Snowbird, Utah, July 11, 2017 (Honored as one of the Founders of the National Neurotrauma Society)
174. "Newer Approaches to Pharmacological Antioxidant Neuroprotection in CNS Injury", Virginia Commonwealth University-Medical College of Virginia; Richmond, VA September 22, 2017.
175. "Preclinical Study Design to Improve Translational Success in Human Traumatic Brain Injury". University of Texas Medical Branch, Galveston, TX, October 11, 2017.
176. "Newer Approaches for Antioxidant Neuroprotection in Traumatic Brain Injury", Purdue University, West Lafayette, IN, November 29, 2017.

## PROFESSIONAL REFERENCES

**Jay A. Perman, M.D.** (former Dean of the University of Kentucky College of Medicine and my direct boss from 2004 to 2010)  
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