

CURRICULUM VITAE

Thomas P. Davis, Ph.D.

Department of Medical Pharmacology

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College of Medicine

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I. EDUCATION

A. INSTITUTIONS, DEGREES & DATES AWARDED:

B.S., Biology, Loyola University of Los Angeles. June 9, 1973.

M.S., Physiology, University of Nevada. May 18, 1975.

Ph.D., Physiology/Analytical Biochemistry, University of Missouri-Columbia.

December 16, 1978.

B. MAJOR FIELDS of RESEARCH :

Major research emphasis is in the areas of central nervous system pharmacodynamics, neuropharmacology, neurochemistry, molecular biology and pathophysiology of the blood-brain barrier / neurovascular unit (BBB/NVU) after acute and chronic pain states and CNS hypoxia/reperfusion/stroke injury, using pre-clinical models.

NEUROPHARMACOLOGY/NEUROCHEMISTRY/MOLECULAR NEUROENDOCRINOLOGY

Molecular signaling of blood brain barrier tight junction protein and P-gp transporter protein trafficking at the BBB/NVU after stroke, acute, chronic or migraine pain.

BIODISTRIBUTION/ PHARMACOKINETICS/ PHARMACODYNAMICS

Effect of acute and chronic pain states on BBB/NVU that limits drug delivery to the

CNS.

Pharmacodynamics of drug-drug interaction including opiates, NSAIDS, statins, neuropharmaceuticals, neuroprotectants and neutraceuticals.

PRESENT TEACHING RESPONSIBILITY – 2019.

Graduate “Medical Pharmacology- Principles and Therapeutics of cardiac, pulmonary, analgesics, anesthetics and drugs of abuse in man” - PHCL 601C (Course Director. Every Fall Semester. LSN 652. COM).

Undergraduate “Senior Research Practicum” - MCB 498H & Biochem 499H (Course Director).

Undergraduate “Independent Study” - Chem 492, MCB 492, Neurosci 920 (Course Director).

Undergraduate “Introduction to Toxicology” – PHCL 422. COM and COP. (Every Fall and Spring Semester. Harvill 115, Main Campus).

Undergraduate “Human Performance Pharmacology” – PHCL 442. COM and COP. (Every Fall and Spring Semester. Harvill 115, Main Campus).

II. PROFESSIONAL AND ACADEMIC EMPLOYMENT

1973-1975 Graduate Research Assistant, Dr. David Bruce Dill's Laboratory of Applied Human Physiology, Desert Biology Research Institute, Boulder City, NV.

1975-1978 Graduate Research Assistant, Dr. Charles W. Gehrke's Experiment Station Chemical

- Laboratory, Department of Biochemistry, University of Missouri - Columbia.
- 1978-1980 Analytical/Development Chemist, Therapy Monitoring Venture Group (TDx), Abbott Pharmaceutical Company, Abbott Park, IL.
- 1981-1986 Assistant Professor- Pharmacology and Founding Director, Laboratory of Analytical Chemistry and Mass Spectrometry, University of Arizona Health Sciences Center. Founding Director, The Arizona Cancer Center Analytical Core Laboratory. Member, Pharmacology/Toxicology Graduate Program and Arizona Cancer Center.
- 1986-1992 Senior Research Fellow, NASA Center for Separation Sciences, University of Arizona Biophysics Technology Laboratory, Engineering Experiment Station, College of Engineering. Member, Pharmacology/Toxicology Graduate Program.
- 1986-1991 Associate Professor with Tenure - Pharmacology and Founding Director, Laboratory of Analytical and Peptide Chemistry, University of Arizona Health Sciences Center. Member, Arizona Cancer Center.
- 1991-present Professor with Tenure - Medical Pharmacology and Founding Director, Laboratory of Blood Brain Barrier Research, University of Arizona Health Sciences Center. Member, Arizona Cancer Center and Pharmacology/Toxicology Graduate Program.
- 1994-1995 Special Volunteer, NIH. National Cancer Institute, Biomarkers and Prevention Research Branch, NIH. Rockville, MD.
- 1999-present Chair, External Advisory Committee. The Aging Brain: Cerebrovascular Mechanisms. Multi-institutional Program. University of Rochester and University of Southern California. Member, Scientific Advisory Board Socratech/ZZ-Biotech. Houston, TX.
- 1999-2006 Founding Director, Program in Research Integrity Education (PRIE), Office of the Vice President for Research and Graduate Studies, University of Arizona.
- 1999-present Professor, Physiological Sciences, Graduate Interdisciplinary Program and Neuroscience, Graduate Interdisciplinary Program, University of Arizona.
- 2005-present Professor, Bio5 Research Institute, University of Arizona.
- 2018-present Professor, Pharmacology / Toxicology, College of Pharmacy, University of Arizona.

Visiting Professorships

Department of Pharmacology, Rudolf Magnus Institute, Laboratory of Professor David De Wied, Ph.D., Director, and Peter Burbach, Ph.D. The Netherlands. June/July, 1986.

Department of Neurosurgery, University of Rochester School of Medicine, Frank P. Smith Laboratory of Professor Berislav Zlokovic, MD, Ph.D., Neuroscience and Neurological Research. July and August 2006, 2007, 2008, 2009 and 2010.

Department of Neurology and Neuroprotection Research Laboratory, Mass General Hospital-Harvard Medical School. Professor Eng Lo, Ph.D. Boston, MA. June 2014, September 2015, June 2016 and 2018.

III. HONORS & AWARDS

Academic State Scholarship Awardee, Loyola University of Los Angeles (1969-1973).

David Bruce Dill Scholar and Awardee in Environmental Physiology, University of Nevada (1975).

Member, Sigma XI - Honorary Research Society of North America (1977).

International Youth in Achievement Award, University of Missouri (1978).

Member, Gamma Sigma Delta – Honorary Agriculture Society, University of Missouri (1978).

Abbott Diagnostics Division Certificate of Achievement Award, Abbott Pharmaceuticals Inc., (1979).

Member, *Who's Who* in the West, U.S., World and Frontiers of Science and Technology (1985).

Fellow, American Institute of Chemists (F.A.I.C.). October, (1986).

Member, Phi Beta Kappa Honorary Society (1995).

Chartered Member, Neurological Sciences III Study Section, N.I.H. / NINDS 1992 to 1996.

Chartered Member, Brain Disorders Clinical Neurosciences (BDCN-3) Study Section, N.I.H./NINDS 1996 to 2002.

Fellow, International Neuropeptide Society. (1998).

Member, International Organizing Committee, 4th International Conference of Cerebral Vascular

Biology, Cambridge University, Cambridge UK, April 7-12, 2001.
Awardee, University of Arizona Faculty Senate, Chair of General Faculty and Faculty Senate,
 “*Extraordinary and Expert Service to the General Faculty of the University.*” March 5, 2001.
Member, International Organizing Committee, 5th International Conference of Cerebral Vascular
 Biology, Amarillo, TX. June, 2003.
Volunteer of the Year Award, Salpointe Catholic High School, Tucson, AZ. 2002-2003.
Awardee and Member, Loyola-Marymount University, College of Science and Engineering,
 “*Alumni Wall of Fame,*” October 18, 2003.
Medallion of Appreciation Awardee, Salpointe Catholic High School Administration and Faculty.
 September 10, 2006.
Elected Chairman, Gordon Research Conference, “Barriers of the CNS”. June 17-22, 2008. Co-
 Chairman, 2006.
Chartered Member, Acute Neural Injury and Epilepsy (ANIE) Study Section, NIH/NINDS. 2010 to 2016.
Ad Hoc Member. NIH-CASIS (Center for the Advancement of Science in Space) Coordinated MPS
Program for TR in Space (UG3/UH3) Study Section. 2017.
Founders Day Awardee and Lecture, University of Arizona College of Medicine. November 16, 2011.
Distinguished Alumnus Award and Speaker. St. Francis High School. La Canada, CA.
 January 31, 2012.
Keystone Speaker Awardee, Gordon Research Conference, “Barriers of the CNS”. Colby-Sawyer
 College, NH. June 16, 2012.
Member, International Organizing Committee, “Brain 2013”, International Society Cerebral Blood
 Flow and Metabolism (ISCBFM). Shanghai, China. May 20-25, 2013.
Ad Hoc Member, Austrian Science Fund- YIRP Study Section. Vienna, Austria. July 30/31, 2018.
Chartered Member, Brain Injury Neuropathology (BINP) Study Section, NIH/NINDS. 2019 to
 present.

IV. TEACHING

A. COURSES TAUGHT:

1. PHARMACOLOGY 501/601; The Pharmacological Basis of Therapeutics
 Enrollment: 100-120 Medical and Graduate Students; Spring, 1985 (Didactic lectures)
 General Principles
 Alcohol
 Vitamins
 Gout
 Drugs of Abuse
 Spring, 1987 to 2006 (Patient Oriented Problem Solving, and Small Group Teaching)
 10 x 3 hour blocks per year.
 Pharmacokinetics Applied to Asthma
 Cancer Drugs
 Treatment of essential hypertension
 Toxicology
 Treatment of congestive heart failure
 Complications of analgesic therapy
 Treatment of Myocardial Infarction
 Antithrombotic Therapy
 Narcotics/Analgesics
 Spring, 1992 to 2006 (Didactic lectures)
 Narcotics/Analgesics
 Drugs of Abuse
2. PHARMACOLOGY 653; Neuropharmacology
 Enrollment: 20-25; Fall, 1985 to 1996.
 Synthesis and Processing of Neuropeptides
 Analytical Techniques in Neuropharmacology
 Laboratory: HPLC Analysis of Peptide Metabolites

3. PHARMACOLOGY 550; Drug Metabolism and Disposition
Enrollment: 30; Fall, 1985; 1986
Separation and Analysis of Drug Metabolites
Structural Assignments by Mass Spectrometry
4. PHYSIOLOGY 501/601; Medical Physiology
Enrollment: 100-120; Spring, 1985; 1986; 1987; 1989; 1990; 1991; 1992; 1993; 1994 to 2001.
Temperature Regulation in Man
Adaptation to Heat
Problem Based Learning (16 hour blocks).
5. PHARMACOLOGY 551; Molecular Biology of Pharmacological Agents
Enrollment: 20; Fall 1989; 1991; 1992; 1993; 1994; 1995; 1996.
Regulation of Neuropeptide Gene Expression
6. PHYSIOLOGY/MEDICINE 495 A/B; Principles of Neuroscience
Enrollment: 15-20; Spring/Fall, 1988
Centrally Active Drugs
Drugs of Abuse
7. MOLECULAR AND CELLULAR BIOLOGY 494; Independent Study for Undergraduates
Enrollment: 2-3 per semester. 3 credit hours per student per semester.
Spring/Fall, 1985; 1986; 1987; 1990; 1991; 1992; 1993; 1994; 1995; 1996; 1997.
Effect of Opioid Peptides on Mu, Kappa and Delta Receptors.
Methods to Control Microflora in Juice Concentrates.
Solid Phase Synthesis of Neuropeptides.
Effect of Cell Passage Number and Mycoplasma on Cytogenetics of SCLC Cells
Characterization of Proteolytic Enzyme Metabolism Using Computer Modeling Techniques.
Use of MTT Assay to Predict Neuropeptide Effects in SCLC Cell Growth.
Development of a Specific and Sensitive Assay for Aminopeptidase M and Leucine.
Aminopeptidase: Application to SCLC Inhibition Studies.
Effect of Peptide Structure on *In Vitro* Enzymatic Metabolism.
Effect of Peptide Structure on Binding to Human Plasma.
Effect of Peptide Structure on Permeability through the Blood-Brain Barrier.
Demonstration of Prohormone Convertase mRNA in Small Cell Lung Cancers.
8. MOLECULAR AND CELLULAR BIOLOGY 266; Principles of Neural and General Pharmacology
Enrollment: 60; Summer 1991
9. CLINICAL ROUNDS, Department of Neurology
Enrollment: 5-20; Spring 1992; 1993
Graduate Level Lectures to Neurology Residents Concerning Polypeptide Hormones.
10. PHARMACOLOGY 696 A, Introduction to PHCL and TOX Research
Enrollment: 2-6 per semester for 3 credit hours per semester; Fall 1992 – present.
Graduate Level Course Offered to Graduate Students. *Director of Course*.
11. PHYSIOLOGY 485, Undergraduate Physiology Course in Cardiovascular Physiology
Enrollment: 50 per year for 4 credit hours per semester; Spring 1999 to 2005.
12. PHYSIOLOGY 549, *Survival Skills and Ethics*. Graduate Course offered each Spring.
Enrollment: 50 per year for 3 credit hours per semester; Spring 2000-2012.
13. PHYSIOLOGY 700, *Research Methodology and Physiological Sciences*. Graduate Course offered each semester. Enrollment: 2 per year for 3 credit hours per semester; Spring 2000 - present.
14. PUBLIC HEALTH 696, *Research Methodology and Design*. Graduate course offered each semester. Enrollment: 10; Fall 2001 to 2006.
15. PHARMACOLOGY and NEUROSCIENCE 595B, *Strategic Scientific Writing and Ethics*.
Enrollment: 40 every Fall semester; Fall 2003 - 2014.
16. CASE BASED INSTRUCTION (CBI), *Cardio/Pulmonary/Renal (CPR) Block. Medical*

Student Facilitator, every Spring for 10 First Year Medical Students. Spring 2007 - 2015.

Present Time Teaching Responsibility is 5 months of each academic year:

17. PHARMACOLOGY 601 C. *Medical Pharmacology* for Graduate Students. This 2 credit section is offered every academic year. I am *Director and lecturer in Section C of the 6 credit 601 required graduate course*. Enrollment is 12 to 15 M.Sc. and Ph.D. level graduate students every Fall semester for the months of October, November and December. 2007 – present.
18. PHARMACOLOGY 422. *Introduction to Toxicology*. 3 credit undergraduate course. I lecture on the pharmacological and toxicological aspects of drugs of abuse, analgesics, caffeine and the opioid “epidemic”. Every Spring and Fall semester for months of October, November, March and April. Enrollment is 45 to 50 upper division, undergraduate students each Spring and Fall semester. 2017 - present.
19. PHARMACOLOGY 442. *Human Performance Pharmacology*. 3 credit undergraduate course. I lecture on several “Performance Enhancing Drugs and Caffeine (Energy Drinks)” each Spring and Fall semester for months of October, November, March and April. Enrollment is 45 to 50 upper division, undergraduate students each Spring and Fall semester. 2017 – present.

B. STUDENT RESEARCH PRECEPTORSHIP CREDIT HOURS TAUGHT

1. UNDERGRADUATE STUDENTS DIRECTED:

1. Ms. Benay Shive, Co-operative Education Program, Antioch College, Cincinnati, Ohio, biochemistry student. “Effect of Parkinson’s Disease on Catecholamine Levels in Discrete Brain Regions.” 6 credits. 4/1/82 to 12/1/82.
2. Ms. Leslie Clark, biochemistry student, University of Arizona. “Cyclosporin A metabolism in heart transplant patients—a study using high performance liquid chromatography.” Biochemistry 494. Senior Practicum. 3 credits. 1/1/83 to 9/1/83.
3. Ms. Ann Peterson, biochemistry student, University of Arizona. “Effect of unique opioid peptides on mu, kappa, and delta receptors.” Senior Practicum. MCB 494. 3 credits. 1/1/85 to 6/1/85.
4. Ms. Lori Trombley, Microbiology student, Univ. of Arizona. “Methods to control microflora in juice concentrates.” Senior Practicum. MCB 494. 3 credits. 1/1/86 to 6/1/87.
5. Mr. Tom DiMatteo, pre-pharmacy student, University of Arizona. “Solid-phase 'Merrifield' peptide synthesis of neuropeptides which regulate gastrointestinal motility. Chemistry 399.” Independent Study. 3 credits. 5/1/87 to 9/1/87.
6. Ms. Susan Crowell, Biochemistry student, University of Arizona. “Effect of cell passage number and mycoplasma on cytogenetics of SCLC cell lines.” MCB 498H. Senior Practicum. 3 credits. 9/1/88 to 5/1/89.
7. Mr. Jim Vranich, Biochemistry student, Humboldt State University, California. Pharmacology/Toxicology National Research Training Program. “Use of biochemical techniques to study enzyme biochemistry.” 5 credits. 5/1/89 to 8/30/89.
8. Mr. Darren Merrill, Biochemistry student, University of Arizona. “Characterization of proteolytic enzyme metabolism of select neuropeptides using computer modeling techniques.” MCB 494. Senior Practicum. 3 credits. 8/1/89 to 12/30/89.
9. Ms. Brena McInturff, Microbiology student, University of Arizona. “Use of MTT assay to predict neuropeptide regulation of small cell lung cancer cell line growth.” MCB 494. Senior Practicum. 3 credits. 8/1/89 to 12/30/89.
10. Ms. Renee Louis, Molecular Biology student, University of Arizona. “Development of a sensitive and specific assay for aminopeptidases in SCLC cell lines.” MCB 494 Senior Practicum. 3 credits. 8/1/90 to 12/30/90.

11. Ms. Diana Greene, Chemistry and Latin student, University of Arizona. "Selected to Undergraduate Biology Research Program for 1990-1992." Distribution of DPDPE and its halogenated analogues in the rat: Effect of blood-brain barrier. Chem. 499. 4 credits. 6/1/91 to 12/30/91.
12. Ms. Tanya Lewis, Molecular Biology student, University of Arizona. "Selected to Undergraduate Biology Research Program for 1991-1992. Effect of peptide structure on membrane passage in the rat." MCB 494. 3 credits. 8/1/91-12/30/91 and MCB 499 Independent Study. 2 credits. 1/1/92-5/1/92.
13. Mr. Brad Merrill, Molecular Biology student, University of Arizona. "Regulation of gene expression for GRP in discrete cell lines." MCB 494. 4 credits. 1/1/92 to 12/31/92. Assistant Professor, University of Illinois at Chicago, Department of Biochemistry and Molecular Genetics.
14. Mr. Tom Abbruscato, Molecular Biology Student, University of Arizona. "Studies of the blood brain barrier using an *in vitro* approach." MCB 494. 2 credits. 8/92 to 12/92. Associate Professor, Texas Tech University College of Pharmacy.
15. Ms. Sharon Hom, Molecular Biology, Student, University of Arizona. "Effect of Antipsychotic Drugs on Neurotensin in the Brain." MCB. 494. 3 credits 8/93 to 5/94.
16. Mr. Erik Szeto, Biochemistry Student, Univ. of Arizona. "Studies on the Metabolism of Substance-P in Discrete Brain Regions." Biochem. 494. 3 credits. 8/94 to 12/94.
17. Ms. Lisa M. Stoll, Molecular Biology, University of Arizona. "Studies on the molecular biology of small cell lung cancer." MCB 492. 6 credits. 8/96 to 5/97.
18. Mr. Vincent Hau, Molecular Biology Student, University of Arizona. "Saturable carriers in bovine endothelial cells and the blood-brain barrier – characterization." MCB 494. 3 credits. 8/96 to 5/97.
19. Ms. Katy Venisnik, Molecular Biology Student, University of Arizona. "Effect of ischemia/aglycemia on endothelial cell cytoarchitecture." MCB 494. 3 credits. 8/99 to 12/99.
20. Mr. Chris Campos, Biochemistry Student, University of Arizona. "Effect of PEG on analgesic efficacy." Biochem. 494. 2 credits. 8/00 to 12/00. Senior Thesis, December 2002 to May 2003, 3 credits.
21. Ms. Lindsay Borg, Biological Sciences Student, Stanford University. "Effect of Hypoxia on endothelial cells of the blood brain barrier." 3 credits. Summer, 2003 to 2005.
22. Ms. Amanda Burroughs, Biology Student, Northern Arizona University. "Effect of hypoxia/reoxygenation on endothelial cell tight junctions." Summer, 2003.
23. Mr. Ryan Davis, Biosystems Engineering Student, University of Arizona "Effect of inflammatory pain on analgesic drug delivery to the brain." Summer and Spring, 2003 to 2005.
24. Mr. Ian Butler, Senior Biochemistry Student, University of Arizona. "Effect of Hypoxia on BBB endothelial cell protein cytoarchitecture-Functional Analysis". January, 2004 to October 1, 2004.
25. Ms. Carolyn Quigley, Physiological Sciences Student, University of Arizona. "Effect of Hypoxia on BBB cytoarchitecture". January 2005 to 2009.
26. Ms. Rachel Charles, Physiology Student, Occidental College. "Effect of Pain and Inflammation on the cytoarchitecture of the blood-brain barrier". 3 Biochem Course credits. Summer, 2005 to 2007.
27. Ms. Jessica Finch, Nursing student, University of Arizona. "Effect of Pain and Hypoxia on Blood Brain Barrier Tight Junction Protein Integrity". 5

- MCB course Credits. 2007 to 2012.
28. Mr. Seph Palomero, student, Pima Community College, "Effect of Pain on trafficking of occludin at the tight junction of the blood brain barrier". 2009 to 2011.
 29. Ms. Kristin DeMarco, Molecular Biology student, University of Arizona, "Effect of pain on the delivery of analgesics to the brain". 5 MCB course Credits. 2007 to 2012.
 30. Ms. Nicole Nametz, Molecular Biology and Medical Student. University of Arizona. 3 Credits. "Effect of pain on occludin protein trafficking at the blood brain barrier. 2005 to 2008.
 31. Ms. Mei Li Laracuente, Chemistry student, University of Arizona. "Effect of hypoxia-reperfusion on nanoparticle drug delivery at the BBB". 5 Biochem Course Credits. 2011 to 2015. Recipient of Outstanding Undergraduate Researcher Award and Galileo Scholar Award for 2014, Department of Chemistry.
 32. Ms. Yifeng Zhang, MCB Student, University of Arizona. 5 Credits. "Effect of pain on P-gp transporter trafficking at the BBB". 2012 - 2015. Recipient of the Galileo Scholar Award, MCB department. Medical Student, 2015-present
 33. Mr. Chaz Schaefer, Biochemistry Student, University of Arizona. 3 Credits. "Effect of peripheral pain on trafficking of P-glycoprotein at the BBB". 2012 - 2015. Graduate student, Medical Pharmacology Graduate Prog, 2015- 2017.
 34. Mr. Fabian Matty, Biochemistry Student, University of Arizona. "Effect of Chronic Pain on the Delivery of Opioids at the BBB." 2014-2015.
 35. Ms. Chelsea Jarvis, MCB/Physiology Student, "Effect of pain on P-gp transporter trafficking at the BBB". 2015- 2017.
 36. Ms. Julia Lipiz, MCB/Biochemistry Student, "Effect of pain on P-gp transporter trafficking at the BBB". 2015 -2018.
 37. Ms. Kristin Hunn, Chemical Engineering Student, "Role of caveolin 1/2 on P-gP trafficking at the BBB". 2016 - 2018.
 38. Mr. Nathan Arkwright, Chemical Engineering Student, "Effect of acute versus chronic pain on P-gP trafficking at the BBB". 2016 - 2018.
 39. Ms. Kathryn Kellohen, Biochemistry Student, "Role of caveolin in regulating P-gP trafficking at the BBB". 2017 - 2018.
 40. Ms. Peyton Mierau, Engineering Student. "Signaling by caveolins at the BBB". 2017 - 2018.

2. MEDICAL STUDENTS DIRECTED:

1. Dr. Abe Hahn, M.Sc. M.D. Master's degree candidate, University of Nevada. 5/1/83-8/1/83. As an invited member of his committee, I directed the major section of his M.Sc. research on "The central processing of β -endorphin in temperature acclimated desert animals" in my laboratory.
2. Dr. Curt Dunshee, B.S., M.D. second year Medical Student, University of Arizona. 6/1/83-5/10/84. "In vitro endorphin metabolism in human cerebrospinal fluid." Medical Student Research Program.
3. Dr. Duncan Tang, B.S., M.D. second-year Medical Student, University of Arizona College of Medicine. 1/1/86-8/30/87. "Isolation and characterization of specific subcellular enzymes in the brain." Medical Student Research Program.
4. Dr. Diana Greene B.S., M.D. Medical Student, University of Arizona College of Medicine. 5/1/92 to 5/1/95. "Blood-brain distribution of opioid Pro-Drugs." Medical Student Research Program grantee. 5/1/92-5/1/95. M.D. degree granted May 10, 1997. Director of Neuroscience Critical Care, Departments of Neurosurgery and Neurology. The Ohio State University

Medical Center. Columbus, Ohio.

5. Dr. Vincent Hau, B.S., M.D., Ph.D. 1998-2005. Doctoral and Medical Student, University of Arizona College of Medicine. "Effect of cationization on the delivery of opioids to the CNS." Medical Student Research Program grantee, Retinal Surgeon. Kaiser Permanente, Riverside, CA. M.D./Ph.D. student. Graduated May, 2005.
6. Dr. Melissa Seelbach, nee Brym, M.D., Ph.D. 2003-2007. "Effect of lambda carrageenan-induced inflammatory pain on brain uptake of morphine : role of P-glycoprotein". Graduated Ph.D. - December, 2007. Fellow, Center for Pain Treatment and Management, University of Arizona Pain Clinic, Tucson.

C. GRADUATE STUDENTS DIRECTED :

1. Mr. Andrew Chen, M.S., 1981-1983. (Graduated 7/1/83). Techn., U.C.S.D. CA.
2. Ms. Li Zhiwei, M.S., 1986-1989. (Graduated 12/1/89). CADRE *Synthesis*, Indus.Park, China
3. Dr. David Clark, DVM, Ph.D., 1990-1993. (Graduated 7/20/93) Retired Senior Scientist, Arizona Cancer Center, Tucson, AZ.
4. Dr. Mary Oakes, Ph.D., 1989-1994. (Graduated 9/1/94) **Recipient of NIH/NRSA Pre-doctoral Fellowship. REHS**, Environmental Health Specialist, Las Vegas, NV. 2000 – present.
5. Dr. James C. Ritchie, M.P.H., Ph.D. – Pharmacology Department, Duke University Medical Center, Durham, N.C., 1989-1995, (Dissertation Co-Director). Graduated 1995. Professor, Pathology, Emory University Hospitals, Atlanta, GA. **NIH RO1 Funded.**
6. Peg Davis, M.S., 1991-1996; (Graduated 5/10/96) Senior, Biochemistry Technician, University of Arizona, Tucson, AZ. Retired, 2015.
7. Dr. Steve Waters, Ph.D., 1992-1996. (Graduated 8/15/96). **Recipient of Pre-doctoral NIH/NRSA Fellowship.** Senior Scientist, Neurogen Biopharm. Pharmacist Manager and owner, Branford, CN.
8. Dr. Tom Abbruscato, Ph.D., 1993-1997. (Graduated 6/25/97). **Recipient of NIH/ NRSA Pre and Post-doctoral Fellowship from N.I.N.D.S.**, Distinguished Professor and Chairman, Department of Pharmaceutical Sciences, Dean of Research and Graduate Studies. Texas Tech University College of Pharmacy, Amarillo, 2012 – present. **Funded NIH RO1 grant.**
9. Dr. Ken Witt, Ph.D., 1998-2001. (Graduated 7/8/01). **Post-doctoral fellow, University of Arizona. Recipient of NIH/ NRSA Post-doctoral Fellowship from N.I.N.D.S. Associate Professor, Southern Illinois University College of Pharmacy, September, 2005-present. Funded by NIH RO1 grants.**
10. Dr. Brian Hawkins, Ph.D. 1999-2004. (Graduated 11/26/04). **Recipient of NIH/NRSA pre-doctoral fellowship.** Medical Faculty Lecturer, University of Washington Medical School, Seattle. 2011-2013. Senior Scientist, Research Triangle Institute (RTI), North Carolina. 2013-present.
11. Dr. Vincent Hau, M.D., Ph.D. 1996-2005. (Graduated 5/10/05). Resident in Ophthalmology, University of Utah-Moran Eye Center, Salt Lake City, Utah. (**Recipient of Deans M.D./Ph.D. Fellowship from NIH**). Pediatric Retinal Surgeon, Kaiser Permanente , Riverside, California.
12. Dr. Sharon Hom, M.S., R.N., Ph.D., 1997-2006. (Graduated 08/05/06). Clinical Instructor , University of Arizona College of Nursing. 2011-present.
13. Dr. Melissa Seelbach, M.D., Ph.D., 2003-2007. (Graduated December 15, 2007) 2007 to 2009. Post-Doctoral Fellow, University of Kentucky, Lexington, KY. Anesthesiology Senior Resident , Univ. of Kentucky Hospitals, Lexington. 2013 to 2017. **Fellow , Comprehensive Pain Clinic. University of Arizona Medical Center / Banner Hospital, Tucson, AZ.**
14. Dr. Christopher Campos, Ph.D., 2004-2009. (Graduated May 10, 2009). Post-Doctoral Fellow at NIEHS, Research Triangle Park, N.C. (12/2009 to 12/2014). Senior scientist, Hoffmann - La Roche Pharmaceutical , Basel, Switzerland. 2015-2018. Principle Scientist, Monster Energy Company, Corona, CA. 2019 – present.
15. Dr. Jeff Lochhead, Ph.D., 2004-2010. Post-Doctoral Fellow, University of Wisconsin College of Pharmacy (2011 to 2016). Research Assistant Professor, Univ, of Arizona, 2017.

Recipient of AHA research scientist development grant 2018-2021.

16. Dr. Lucy Sanchez-Covarrubias, Ph.D. 2007-2013.(Graduated 5/18/2013) (Post-Doctoral Fellow, University of Arizona College of Medicine, Tucson. **Recipient of NIH/NRSA Pre-doctoral fellowship**).

17. Mr. Charles Schaefer, B.Sc., M.Sc. 2015-2017. Medical Pharmacology graduate program, University of Arizona. Tucson. Graduated 2017. **Research Assistant** , Physiology Department. Midwestern University. Phoenix, AZ.

D. POSTDOCTORAL FELLOWS and RESEARCH PROFESSORS DIRECTED:

1. Hans Schoemaker, Ph.D., 1983-1985. Director of Neuroscience, Sanofi-Synthelabo Recherche. Institute, Bagneaux, France. (Co-mentored with H.I. Yamamura).

2. R.K. Rao, Ph.D., 1988-1990. Professor of Medical Physiology, University of Tennessee College of Medicine, Memphis, TN. (Co-mentored with O. Koldovsky). **Multiple NIH RO1 Grants.**

3. Pierre Konings, Ph.D., 1990-1992. European Trademark and Design Attorney, NLO Shieldmark, Eindhoven Area, The Netherlands.

4. Steve Weber, Ph.D., 1990 - 1993. Chief Executive Officer, PharmaOptima LLC., Kalamazoo, Michigan.

5. David Clark, Ph.D., July 1993 to December 1993. Retired-Senior Research Scientist, Iowa.

6. Barbara Mania-Farnell, Ph.D., 1992-1994. Professor of Pharmacology, Purdue University School of Nursing, Calumet, IN. **NIH funded past.**

7. Ana Brownson, Ph.D. 1993-1994. Senior Research Fellow, Biological Sciences, Colorado State University Fort Collins, CO.

8. Chris Konkoy, Ph.D., 1992-1995. Scientific Communications Consultant, Eli Lilly Pharmaceutical Co., Indianapolis, IN.

9. John Schetz, Ph.D., 1994-1995. Professor, Physiology, Univ. of North Texas. **NIH RO1 funded.** Deceased.

10. Sarah Thomas, Ph.D., 1994-1996. Reader in Physiology, Department of Physiology, Guys and St. Thomas Medical School, Neuroscience Division, Kings College, London, U.K.

Funded MRC research foundation in UK.

11. Allen Erenberg, M.D., Visiting Research Professor of Pharmacology, Univ. of Kansas Medical Center, 1995-1996. Professor of Pediatrics, University of Arizona-retired.

12. Matthew Rounseville, Ph.D., September 1995 - 1999. Senior Scientist, High Throughput Genomics (HTG), University of Arizona Biotechnology Park, Tucson, AZ.

13. Thomas J. Abbruscato, Ph.D., July 1, 1997- May 01, 2000. Professor and Chairman, Pharmaceutical Sciences Department, Texas Tech University College of Pharmacy, Amarillo, TX. **Multiple RO1 grants.**

14. Richard D. Egleton, Ph.D., December 1996- May 2007. Professor, Physiology and Pharmacology, Marshall University School of Medicine, Huntington, WV. **NIH funded.**

15. Karen Mark, Ph.D., October 1, 1999-December 31, 2003. Associate Professor, Pharmaceutical Sciences Department, South College School of Pharmacy, Knoxville, TN. **NIH funded.**

16. Anne Wolka, Ph.D., June 1, 2002-November 26, 2003. Benefit-Risk Consultant Scientist, Associate. Eli Lilly Pharmaceutical., Indianapolis, IN

17. Jason Huber, Ph.D., July 1, 1999-March 01, 2004. Professor, Department of Pharmacology, West Virginia University, College of Pharmacy, Morgantown, WV. **NIH RO1 Funded.**

18. Rachel Brown, Ph.D., 2000-2004. Visiting Researcher, Kings College, London. Research Assistant Professor, Department of Integ. Biology and Pharmacology, University of Texas Health Sciences Center Houston. **NIH funded past.**

19. Ken Witt, Ph.D., July 1, 2001-2005. Associate Professor, Pharmacology, Southern Ill. University School of Pharmacy, Edwardsville, Illinois. **Multiple NIH RO1 funded.**

20. Melissa Fleegal, Ph.D., June 1, 2003 - July 15, 2006. Associate Professor, Biological Sciences, Clarke College, Des Moines, Iowa. **NIH funded past.**

21. Tracy Brooks, Ph.D., March 1, 2004 - January 01, 2007. Endowed Associate Professor, Pharmaceutical Sciences Department, State University of New York Pharmacy School. New York. NIH funded past. **Endowed professor.**
22. Scott Ocheltree Hynes, Pharm.D., Ph.D., June 1, 2005 - May 30, 2006. Principle Research Scientist, Eli Lilly Pharmaceutical Inc., Indianapolis, IN.
23. Gwen McCaffrey, Ph.D., Research Specialist. Retired. 2005-2012. University of Arizona.
24. Colin Willis, Ph.D., Research Assistant Professor, August 2007-2010. Assistant Professor, University of New England College of Osteopathic Medicine, Maine. Retired.
25. Patrick Ronaldson, Ph.D., Post-Doctoral research fellow, 2008-2011. Associate Professor tenured, University of Arizona College of Medicine, Department of Pharmacology. **Multiple NIH RO1, PHarma and AHA grants Funded.**
26. Margaret Tome, Ph.D., Emeritus Assistant Professor, Research Track, University of Arizona College of Medicine, Department of Pharmacology. 2013 - 2018. **NIH funded to 2018.**
27. Joseph Herndon, Ph.D., Post-doctoral research fellow. 2014 - 2015. Scientist , Roche Diagnostics / Ventana Medical Systems. Oro Valley, AZ. **NIH funded to 2015.**
28. Jeff Lochhead , Ph.D., Assistant Professor, Research Track, University of Arizona College of Medicine, Department of Pharmacology. 2016 – present. **AHA grantee 2018-2021.**

E. VISITING PROFESSORSHIPS SPONSORED AT UNIVERSITY OF ARIZONA

- Greg Del Zoppo, M.D., Ph.D., Department of Medicine, University of Washington College of Medicine, Seattle, WA. At University of Arizona, January, 2009 and March, 2010.
- Eng Lo, Ph.D., Department of Neurosurgery and Neuroscience, Harvard Medical School, Boston, MA. At University of Arizona, September , 2011.

V. PROFESSIONAL SERVICE ACTIVITIES

A. DEPARTMENTAL COMMITTEES

- Department of Neurology/Biochemistry Faculty Search Committee, University of Arizona, College of Medicine, 1987-1989.
- Department of Pharmacology Faculty Search Committee, University of Arizona, College of Medicine, 1985-1990 and 2013-2015.
- Department of Pharmacology and Department of Pharmacology/Toxicology Graduate Program Executive Council, University of Arizona Health Sciences Center, 1987-1995. 2002-2005.
- Member, Medical Pharmacology Graduate Admissions Committee, January, 2004–2012.
- Member, Medical Pharmacology Department Chair Academic Program Review, 2011 and 2019.
- Chairman, Medical Pharmacology Department Head Search Committee, 2013.
- Member, Medical Pharmacology Department, Post-Tenure Review Committee, 2017 - 2020.

B. COLLEGE OF MEDICINE COMMITTEES

- University of Arizona College of Medicine, Medical Student Admissions Interviewer, 1981-2011.
- University of Arizona College of Medicine, Committee on Medical Student Honors and Awards 1983-1987. Chairman, 1985-1987.
- University of Arizona College of Medicine, Ad Hoc Committee on Guidelines for Dual-Track System Promotion and Tenure, 1983.
- University of Arizona College of Medicine Committee on Medical Student Progress, 1984-1986.
- University of Arizona College of Medicine LCME Subcommittee F on Basic Science Departments January 1, 1990-January 31, 1996.
- University of Arizona Pre-Medical Honor Society Advisory Committee; Chairman, 1991-1992.
- University of Arizona College of Medicine Committee on Pediatrics Clerkship Review Dec,

1992-July 1993.

University of Arizona College of Medicine Committee on Problem Based Learning in Basic Science Curricula, 1995-1996.

University of Arizona College of Medicine Graduate Education Advisory Committee (GEAC) 1988-2001; Chairman, 1990-2001.

University of Arizona College of Medicine Committee of Nine, 2004-2009.

University of Arizona College of Medicine Founders Day Committee, Chairman, 2012.

C. UNIVERSITY COMMITTEES

University of Arizona Committee on Biophysics (CB), and Curriculum Committee, 1989-1994.

University of Arizona Committee on Academic Freedom and Tenure (CAFT), May 1990 - April 1992.

University of Arizona Committee on Graduate Study (CGS), May 1991-May 1999.

University of Arizona Committee on Ethics and Commitment (UCEC), May 1994-May 2000. Chairman, May 1995-January 1999. Co-Chairman, Education/Research Integrity, January 1999-May 2000.

University of Arizona Faculty Senate, Senator, August 1996-May 2001.

University of Arizona Committee on Science and Technology Park, May 1996-2000.

Member, Technology Transfer Committee (TTC), Univ. of Arizona, September 1996-September 2000.

University of Arizona Faculty Co-Governance Committee, October 1997-October 1998.

University of Arizona Committee on Corporate Relations, Chairman, March 1999-February 2001.

University of Arizona Intercollegiate Athletics Committee (ICAC), 1999-2012.

Member, Neuroscience Advisory Council to Senior VP-Health Sciences, 2013-2018.

D. THESIS AND DISSERTATION COMMITTEE MEMBERSHIP

1. Ron Webb, Ph.D. - Pharmacology/Toxicology, 1981-1983. Graduated 1983.
2. Charles Prussak, Ph.D. - Pharmacology/Toxicology, 1981-1983. Graduated 1983.
3. Steven Glass, M.S. - Pharmacology/Toxicology, (M.S. Program), Graduated 1983.
4. Rick Schnellman, Ph.D. - Pharmacology/Toxicology, 1982-1984. Graduated 1984.
5. Robert Dorr, Ph.D. - Pharmacology/Toxicology, 1982-1984. Graduated 1984.
6. Lane Hirning, Ph.D. - Pharmacology/Toxicology, 1982-1985. Graduated 1985.
7. Andrew Chen, M.S. - Pharmacology, (M.S. Program), 1983-1985. (Thesis Director); Graduated 1985.
8. Joni Kathryn Kalis, M.S. - Exercise and Sports Medicine (M.S. Program). Graduated 1985.
9. Sara Jilka, M.S. - Exercise and Sports Medicine (M.S. Program) 1985.
10. Muhammad Schumann, Ph.D. - Pharmacology/Toxicology, 1985-1986. Graduated 1986.
11. Arthur Buckley, Ph.D. - Pharmacology/Toxicology, 1984-1986. Graduated 1986.
12. David B. Duignan, Ph.D. - Pharmacology/Toxicology, 1984-1987. Graduated 1987.
13. Paul Ciaccio, Ph.D. - Pharmacology/Toxicology, 1986-1989. Graduated 1989.
14. Zhiwei Li, M.S., M.D. - Pharmacology (M.S. Program), 1986-1989 (Thesis Director). Graduated 1989.
15. J. Andrew Taylor, Ph.D. - Animal Physiology, 1986-1990. Graduated 1990.
16. Qi Jiang, Ph.D. - Pharmacology/Toxicology, 1986-1991. Graduated 1991.
17. Dave Clark, DVM, Ph.D. - Pharmacology/Toxicology, 1990-1993. (Dissertation Director). Graduated 1993.
18. Ken Wild, Ph.D. - Pharmacology/Toxicology, 1989-1993. Graduated 1993.
19. Mary Oakes, Ph.D. - Pharmacology/Toxicology, 1989-1994. (Dissertation Director). Graduated 1994.
20. Li Fong, Ph.D. - Pharmacology/Toxicology-1991-1994. Graduated 1994.
21. Hong Bing Wei, Ph.D. Pharmacology/Toxicology, 1992-1994. Graduated 1994.

22. James C. Ritchie, M.P.H., Ph.D. - Pharmacology, Duke University Medical Center, Durham, N.C., 1989-1995, (Dissertation Co-Director). Graduated 1995. Professor, Pathology, Emory University Hospitals, Atlanta, GA.
23. Alexander Clar, M.S., Pharmacology, 1994-1996. Graduated 1996.
24. W. Kong, Ph.D. - Physiology/Toxicology, 1988-1996. Graduated 1996.
25. Peg Davis, M.S. Pharmacology, 1991-1996 (Thesis Director). Graduated 1996.
26. Steve Waters, Ph.D. - Pharmacology/Toxicology, 1992-1996 (Dissertation Director). Graduated 1996.
27. Craig Mayr, Ph.D. - Pharmacology/Toxicology, 1992-1997. Graduated 1997.
28. Tom Abbruscato, Ph.D. - Pharmacology/Toxicology, 1993-1997 (Dissertation Director). Graduated 1997. Distinguished Professor, Texas Tech Pharmacy School.
29. Farshad (Mazda) Shirazi, M.D., Ph.D., Pharmacology/Toxicology 1992-1997 Graduated 1997. Tenured Professor of Emergency Medicine.
30. Hiram E. Albino, M.S. Pharmacology/Toxicology, 1998-2000. Graduated 2000.
31. Art Riegel, Ph.D., Pharmacology/Toxicology, 1999-2001. Graduated 2001.
32. Ken Witt, Ph.D. - Pharmacology/Toxicology (Dissertation Director). 1998-2001. Graduated May 15, 2001. Associate Professor, Southern Illinois University.
33. Brian Hawkins, Ph.D. - Neuroscience (Dissertation Director). 1999-2004. Graduated December 15, 2004.
34. Karin Witt-Sandoval, Ph.D. Pharmacology/Toxicology, 2000-2004. Graduated 2004.
35. Vincent Hau, M.D., Ph.D. - Pharmacology/Toxicology (Dissertation Director) Graduated May 10, 2005.
36. Sharon Hom, M.S. Ph.D. - Physiology (Dissertation Director). 1999-2006. Graduated August 10, 2006. Lecturer, University of Arizona College of Nursing.
37. Lori Buhlman, Ph.D., Neuroscience Graduate Program, (Chair, Ph.D. Committee). 2001-2007.
38. Melissa Seelbach Ph.D., Pharmacology/Toxicology, (Dissertation Director). 2003-2007. Graduated December 15, 2007. Medical Student, Marshall University, WV.
39. Christopher Campos, Ph.D., Medical Pharmacology, (Dissertation Director). 2003-2009. Graduated May 10, 2009. Post-doctoral Fellow, NIEHS, Research Triangle Park, NC. 2009-2014.
40. Jeff Lochhead, Ph.D., Neuroscience Graduate Program (Dissertation Director). 2004-2010. Post-doctoral fellow, University of Wisconsin with Robert Thorne, Ph.D.
41. Lucy Sanchez-Covarubias, Ph.D. Medical Pharmacology Graduate Program (Dissertation Director). 2007-2013. Graduated May 01, 2013. Post-Doctoral fellow, University of Arizona College of Medicine, Tucson, AZ. 2013 - 2014.
42. Crista Lickteig, M.Sc., Perfusion Sciences/Medical Pharmacology Masters Program. 2009 to 2011. Graduated 2011.
43. Gabriel Knudsen, Ph.D., Medical Pharmacology. 2006-2011. Graduated 2011.
44. Wexi Kong, Ph.D., Pharmacology/Toxicology Graduate Program. 2007-2012. Graduated 2012.
45. Tiffany Marie Robb, M.Sc. Medical Pharmacology M.Sc. Program. 2010-2012.
46. Molly Oldeen, M.Sc. Medical Pharmacology M.Sc. Program. 2010-2012.
47. Karissa Cottier, B.Sc. Ph.D., Medical Pharmacology Ph.D. program. 2014 – 2018.
48. Arturo D. Balajadia Jr, B.Sc., M.Sc. Perfusion Science/Medical Pharmacology Masters Program. 2015 - 2018.
49. Charles Schaefer, B.Sc., M.Sc. Medical Pharmacology. (Thesis Co-Director). 2015 - 2017. Graduated 2017. Research Assistant, Physiology. Midwestern University, Phoenix, AZ.
50. Junzhi Yang, B.Sc. Medical Pharmacology Graduate Program (Ph.D. Dissertation Committee Member) 2018-present.

E. EDITORIAL POSITIONS

Editorial Advisory Board, *Life Sciences Journal*, 1984-1988.

Editorial Advisory Board, *Peptides - An International Journal*, 1982 to present.
Associate Editor, *Life Sciences Journal*, 1988-2007.
Editorial Advisory Board, *Journal of Pharmacology and Experimental Therapeutics*, 1999-2007.
Associate Editor, *Current Pharmaceutical Design*, 2008 to present.
Editorial Advisory Board, *Fluids and Barriers of the CNS*. 2010 to present.
Editorial Advisory Board, *Biochemical Pharmacology*, 2011 to present.
Editorial Advisory Board, *Tissue Barriers*, 2013 to present.
Editorial Advisory Board, *Journal of Addiction and Neuropharmacology*, 2014 to present.
Editorial Advisory Board, *Toxicology*, 2015 to present.

F. GRANT STUDY SECTION SERVICE

Ad Hoc Grant Review, National Science Foundation, 1981-1983, 1988-present.
Ad Hoc Grant Review, National Institute of Health, 1982-1983, 1988-1995, 2000-present.
Ad Hoc Grant Reviewer, Natural Sciences and Engineering, Research Council of Canada, 1989-present.
Member, National Research Council (National Academy of Sciences) Fellowship Evaluation Panel in Cell Biology/Regulation and Neuroscience, National Research Council, Institute of Medicine. Washington, D.C., 1988-1991.
Chairman, Veterans Administration Program Project Site Visit Team evaluating research program of Abba S. Kastin, M.D. Tulane University, VA Medical Center, New Orleans, LA., June 1-2, 1989.
Grant Reviewer, Career Development Program Applications. Veterans Administration, Department of Medicine and Surgery, Washington, D.C. 20420. August 8, 1989 to present.
Chartered Member, Neurological Sciences III Study Section, N.I.N.D.S./N.I.H., April 1, 1992-April 1, 1996.
Member, NIH/NIA. Program Project Review Panel. University of Southern California, Department of Neurosurgery, 1998.
Chartered Member, Brain Disorders Clinical Neurosciences 3 (BDCN3) Study Section, NINDS/N.I.H., July 1, 1996-July 1, 2002.
Member, American Heart Association, Brain 2 Study Section, 2004 to 2005.
Chartered Member, Brain Injury Neuropathology (BINP) Study Section, NINDS/NIH, August 1, 2002 to 2006.
Ad Hoc Grant Reviewer, NIH Brain Disorders Clinical Neurosciences 2, 3 and 4, CDIN, CNBT, and MDCN- 3 and 5, Study Sections, November 2002 to 2012.
Merit Reviewer, Department of Veterans Affairs, California. April 2002 to 2014.
Ad Hoc Grant Reviewer, Philip Morris External Research Program. October 2002 to 2012.
Ad Hoc Grant Reviewer, American Heart Association Brain 2 Study Section. January 2004.
Chartered Member, Acute Neural Injury and Epilepsy (ANIE) Study Section NINDS/NIH. July , 2010 to July , 2016.
Ad Hoc Grant Reviewer, Natural Sciences and Engineering Research Council (NSERC) and the Canadian Institutes of Health Research (CIHR). January-April, 2013.
Ad Hoc Grant Reviewer, National Institute for Environmental Health Sciences. (NIEHS), Laboratory of Toxicology and Pharmacology. Research Triangle Park, N.C. April 14-16, 2013.
Ad Hoc Grant Reviewer, BINP/ SEP - NINDS - NIH. Washington, DC. November 19 to 21, 2013. February / March , 2017/ March , 2018.
Ad Hoc Grant Reviewer, BIO-5 Research Institute, University of Arizona. May/June, 2016 & 17.
Ad Hoc Grant Reviewer, NINDS-NIH. R13 Scientific Meetings ZNS1 SRB-K (08). Nov.9, 2017 and June 21/22, 2018.
Ad Hoc Grant Reviewer, Austrian Science Fund- YIRP Study Section .Vienna,AU. July, 2019
Ad Hoc Grant Reviewer, NIH. Special Emphasis Panel/Scientific Review Group ZTR1 TC-7 (01) 06, 19.
Chartered Member, Brain Injury Neuropathology (BINP) Study Section of the NINDS/NIH. October 01, 2019 to Present.

G. JOURNALS REFEREED

Journal of Chromatography, 1981-present.
Analytical Biochemistry, 1985-present.
Experimental Neurology, 1983-present.
Peptides, 1983-present.
Cancer Research, 1985-present.
American Journal of Physiology, 1985-present.
Toxicology and Applied Pharmacology, 1985-present.
Journal of Pharmacology and Experimental Therapeutics, 1985-present.
International Journal of Peptide and Protein Research, 1986-present.
Biomedical Chromatography, 1988-present.
Molecular Pharmacology, 1988-present.
European Journal of Pharmacology, 1986-present.
Journal of Micronutrient Analysis, 1988-present.
Drug and Chemical Toxicology, 1990-present.
Journal of Pharmaceutical Sciences, 1990-present.
Journal of Andrology, 1991-present.
Brain Research, 1992-present.
Proceedings of the National Academy of Sciences, 1992 – present.
Journal of Neurochemistry, 1992-present.
Endocrinology, 1993-present.
Journal of Infectious Diseases, 1996-present.
Pharmaceutical Research, 1996-present.
Journal of Neuroscience, 1999-present.
Journal of Biological Chemistry, 2003-present.
Stroke, 2005-present.
Neuroscience Letters, 2006-present.
Journal of Cerebral Blood Flow and Metabolism, 2008-present.
Fluids and Barriers of the CNS, 2010 - present.
Frontiers in Vascular Physiology, 2011- present.
Science Translational Medicine, 2013- present.
Journal of Histochemistry, 2013- present.
Tissue Barriers, 2013- present.
PlosOne, 2012- present.
Frontiers in Neuroscience, 2014- present.
Neural Plasticity, 2014- present.
Microvascular Research, 2014-present.
Clinical and Experimental Metastasis, 2015-present.
Neuroscience International, 2017-present.

H. PROFESSIONAL BUSINESS APPOINTMENTS

Advisor, Pharmacokinetics/Metabolism of Anti-Neoplastic Drugs. Lederle Labs, Pearl River, NY, 1980-83.
Consultant, Analytical Toxicology and Pharmacology of Drugs of Abuse. Assoc. in Lab Medicine/Office of the Medical examiner, Tucson, AZ. 1981-85.
Member, Board of Directors, Hansen Natural Inc. City of Industry, CA, 1987-88.
Consultant, IPSEN Pharmaceuticals., Biomeasure Neuropharmaceutical Inc., Milford, Mass., 1992-2011.
Chief Scientific Officer, Monster Energy Co., Corona, CA. 1991-present.
Consultant, Neurex Corporation/Elan Pharmaceutical, Menlo Park, CA, 1994-2001.
Collaborator, Parke-Davis Pharmaceutical Research, Ann Arbor, MI, 1995-1999.
Consultant, Nektar/Inhale Therapeutics/Shearwater Polymers.1997-2002.
Member, Speakers Bureau, Smith-Kline Beecham Pharmaceutical, 2001-2004.
Consultant , Socratech Biotechnology LLC., and ZZ Biotech LLC. Houston, Texas. 2006-

present.

Member, Scientific Advisory Board (SAB), ZZ Biotech LLC. Houston, TX. 2006-present.

Consultant, Leading Brands, Inc., Vancouver, B.C., Canada, 2001-2003.

Consultant, Nasteck Pharmaceutical Co., Bothell, WA. 2005-2006.

Member, International Life Sciences Institute (ILSI-North America) 2014-2017.

Member, American Beverage Association (ABA), “Caffeine Science and Toxicology Working Group”, Washington, D.C., 2014 – present.

I. MEMBERSHIP IN PROFESSIONAL SOCIETIES

Phi Beta Kappa Honorary

Sigma XI Honorary

Gamma Sigma Delta Honorary

Society for Neuroscience (SN)

American Physiological Society (APS)

American College of Sports Medicine (ACSM)

American Chemical Society (ACS)

The Association of Official Analytical Chemists (AOAC)

American Society for Pharmacology & Experimental Therapeutics (ASPET)

American Society for Clinical Pharmacology and Therapeutics (ASCPT)

American Society for Testing and Materials (ASTM)

Gastroenterology Research Group (GRC)

International Association for Vitamin and Nutritional Oncology (IAVNO)

International Brain Research Organization (IBRO)

Society of Environmental Toxicology and Chemistry (SETAC)

American Peptide Society (APS)

American Institute of Chemists (Fellow, 1986)

The International Neuropeptide Society (Fellow, 1997)

Controlled Release Society (CRC)

American Diabetes Association (ADA)

International Brain Barriers Society (IBBS Founding Member)

American Association of Pharmaceutical Scientists (AAPS)

The Microcirculatory Society (MCS)

The International Cerebral Blood Flow and Metabolism Society (ICBFM)

American Association of Pharmaceutical Scientists (AAPS)

Society of Toxicology (SOT)

American Heart Association (AHA)

J. SERVICE TO THE COMMUNITY

Invited Lecture, Associates in Laboratory Medicine, Tucson, AZ. Therapeutic Drug Monitoring and Pharmacokinetics. June, 1983.

Advisor, Analytical Toxicology and Pharmacology of Drugs of Abuse. Office of Medical Examiner, Pima County, Tucson, AZ, 1982-1986.

Invited Lecturer, Palo Verde Mental Hospital Medical Staff. Recent Advances in Therapeutic Drug Monitoring and Mental Disease. 1.5 Continuing Medical Education (CME) units. May, 1985.

Speaker, Rincon Optimist Club, Tucson, AZ. Alzheimers Disease and Dementia-Chemical Changes and Aging, March 30, 1988.

Member, Science Advisory Group, Catalina Foothills School District, 1995-1997, Tucson, AZ. Redesign the K-12 Science Curricula for school district.

Assistant Scout Master, Catalina Council, Boy Scouts of America, Tucson, AZ. 1995-1998.

Head Coach, Canyon View Little League. Majors Division, 1996-1997. Juniors Division, 1997-1999.

Invited Lecturer, Green Fields Country Day School Issue Day, Tucson, AZ, The Brain and Central Nervous System, November, 1997.

Member, Strategic Planning Committee, Salpointe Catholic High School, Tucson, AZ, 2000-2004.

Facilitator, Focus Group, 5 year Strategic Plan, Salpointe Catholic High School. February-March, 2001.

Invited Lecturer, Salpointe Catholic High School, Tucson, AZ. Senior Honors Biology Class. Present a series of invited lectures on Scientific Method, Blood Brain Barrier Research, Diabetes Research, Pain Research, Hypoxia/Stroke Research and Nicotine Research each Fall/Spring semester, 2002 to 2009.

Member, Board of Directors, Salpointe Catholic High School, Tucson, AZ., 2004-2005.

Member, Rotary International, Tucson Sunrise Rotary Club, 2003 to 2010.

Member, Jackson Hole Rotary, 2010 to 2013.

Member, International Program Committee, "BRAIN 2013", International Cerebral Blood Flow and Metabolism Society (ICBFM), Shanghai, China. May 21 – 25, 2013.

K. SERVICE TO THE STATE

Course Co-Director, Department of Public Safety (DPS) State Crime Laboratory. Basic Pharmacology Course, Phoenix, AZ. Presented course in Basic Pharmacology to staff chemists representing all DPS State Crime Lab satellites. May 21-June 11, 1981.

Advisor, State of Arizona Department of Health Services Environmental Pollutants Education Workshop Subcommittee, Bureau of Laboratory Services, Phoenix, AZ, 1983.

Invited Lecturer, Arizona Society of Medical Technologists. "Recent advances in neurochemistry of Alzheimers Disease." April 27, 1989. Continuing Education Units (CEU) given (0.10).

Director, Laboratory of Analytical and Peptide Chemistry. As founding director of this laboratory from 1980 to 2000 and formally trained in Gas Chromatography/Mass Spectrometry at the Finnegan Institute in Ohio, I provided forensic, poison control, toxicological, legal, water, beverage and environmental pollutant analyses and service to many citizens, city and state agencies in Arizona. This laboratory received state certification for the chemical analysis of public drinking water on 5/15/85.

L. SERVICE TO REGULATORY AND LEGAL GROUPS

Member, American Society for Testing and Materials (ASTM) National Committee F-2 on Flexible Barrier Materials, 1984-1998.

Expert Witness, Federal Arbitration for OCAW Union Case. Efficacy of Gas Chromatography/Mass Spectrometry Methods for Testing Drugs of Abuse by Employers. Bismarck, ND. January-November 1987.

Collaborator/Investigator, National Bureau of Standards, Micronutrient Analyses, Washington, DC. 1985-1990.

Invited Faculty Member, Federal Judicial Center, Education and Training Division, Defender Services Division, Washington, DC. Invited presentation on "Drug Analyses and Pharmacology for the Trial Lawyer." Phoenix, AZ. December 4, 1989.

Member, American Society for Pharmacology and Experimental Therapeutics National Subcommittee on Public Information, 1/1/90 - 12/31/96.

Organizer and Director of Conference, N.I.H., Office of Research Integrity. Colloquium on Management of Biomedical Research Laboratories: A National Conference. University of Arizona, Tucson, AZ, October 1-3, 1998.

Member, American Beverage Association, Caffeine Science and Toxicology Working Group. Washington, DC. 2014-2021.

Member, International Life Sciences Institute, Caffeine Working Group, Washington, DC. 2015-2018.

VI. PUBLICATIONS

A. SCHOLARLY MONOGRAPHS, ONLINE LECTURES AND BOOKS

1. Davis, T.P. *High performance liquid chromatography of biogenic amines in cattle: Effect of heat, cold, and dehydration*. Ph.D. Thesis, University of Missouri-Columbia, 1978.
2. Davis, T.P. *Management of Biomedical Research Laboratories: A National Conference*. Proceedings, 244 pp. Thomas P. Davis, Editor. University of Arizona Press. 1999.

3. Davis, T. P., 2009, "Blood-brain barrier in health and disease", Kastin, A. and Pan, W. (eds), In: *The Blood-Brain Barrier: Understanding the regulatory gatekeeper between brain and body*. The Biomedical & Life Sciences Collection, Henry Stewart Talks Ltd, London (online at <http://www.hstalks.com/?t=BL0381811-Davis>). 2009.
4. Davis, T. P. November 14, 2011. Founders Day Awardee and Lecture. "The Blood-Brain Barrier: Target or Obstacle for Drug Delivery to the Brain". (online at <http://opa.ahsc.arizona.edu/newsroom/news/2011/'-blood-brain-barrier-target-or-obstacle-drug-delivery-brain'-nov-16>).
5. Davis, T. P. Book Editor. *Advances in Pharmacology*. "Pharmacology of the Blood Brain Barrier: Targeting CNS Disorders". Thomas P. Davis, Editor. Academic Press. Volume 71. 550 pages and 15 Chapters. Published : October 10, 2014.

B. INVITED PEER REVIEWED CHAPTERS IN SCHOLARLY TEXT BOOKS

1. Davis, T.P. and L.J. Kettel. Gas chromatography/mass spectrometry and medicine. *Arizona Medicine* 39, 529. 1982.
2. Davis, T.P., Gehrke, C.W. Jr., Gerhardt, K.O., Williams, C.H. and Gehrke, C.W. "Pre-column Derivatization, HPLC and Fluorescence Measurement of Biogenic Amines in Biological Materials." In: *Clinical Analysis of Exogenous and Endogenous Constituents by Liquid Chromatography*. Edited by Pokar Kabra and Laurence Marton, CRC Press, Inc., West Palm Beach, FL. 1983, pp. 53-64.
3. Alberts, D.S., Y-M. Peng, S. Leigh, T.P. Davis and D.L. Woodward. Pharmacokinetics of bisantrene in cancer patients. In: *Bisantrene* (C. Coltman, Ed.) Verlag, H. Egerman, Vienna, Austria 1983. pp. 1-5.
4. Alberts, D.S., Y-M Peng, S. Leigh, T.P. Davis and D.L. Woodward. Pharmacokinetics of mitoxantrone in patients. In: *Mitoxantrone* (I. Smith, Ed.), Verlag H. Egerman, Vienna, Austria. 1983. pp. 6-11.
5. Burks, T.F., T.P. Davis and J.N. McDougal. Metabolism and thermopharmacology of opioid peptides in rat brain. In: *Environmental Drugs and Thermoregulation*. Edited by P. Lomax, S. Schoenbaum and B. Cox. Karger Pub., Basel, Swz. pp. 94-97. 1983.
6. Goodman, G.E., D.S. Alberts, Y-M Peng, J. Beaudry, S. Leigh, F.L. Meyskens, Jr. and T.P. Davis. Pharmacokinetics and Phase I trial of retinol and 13-cis-retinoic acid. In: *Modulation and Mediation of Cancer by Vitamins*. F.L. Meyskens and K. Prasad, editors. S. Karger, Publishers, New York, NY. 1984. pp. 311-316.
7. Alberts, D.S., C. Mackel, Y-M. Peng, and T.P. Davis. Phase I clinical investigation and preliminary pharmacokinetics of 9-10 anthracenedicarboxaldehyde bis (4,5-dihydro-1H-imidazole-2-yl) (hydrazone) dihydrochloride (bisantrene) with correlative *in vitro* human tumor clonogenic assay. In: *New Anthracene Drugs* (M. Rozenzweig, Ed.) Raven Press, New York, pp. 149-173. 1983.
8. Alberts, D.S., L. Edwards, Y. Peng, R. Serokman, T.P. Davis, and F.L. Meyskens. Clinical toxicology pharmacokinetics of 13-cis retinoic acid administered chronically at low doses expected for cancer chemoprevention trials. In: *Vitamins and Cancer - Human Cancer Prevention by Vitamins and Micronutrient* (Edited by F.L. Meyskens and K.N. Prasad) Humana Press, Inc. pp. 245-255. 1985.
9. Hameroff, S.R., R.C. Cork, J.L. Weiss, B.R. Crago, and T.P. Davis. Doxepin effects on chronic pain and depression: A controlled study. In: *Advances in Pain Research and Therapy*. (H. Fields, R. Dubner and F. Cervero, Eds.) Raven Press, New York. pp. 761-771. 1985.
10. Davis, T.P. and M.K. Yousef. Sweat loss and voluntary dehydration during work in humid heat. In: *Adaptive Physiology to Stressful Environments*. Edited by S. Samueloff and M.K. Yousef. CRC Press, Inc., West Palm Beach, FL., pp. 103-112. 1987.
11. Davis, T.P. and M.K. Yousef. Opioid peptides and adaptation to the environment. In: *Adaptive Physiology to Stressful Environments*. Edited by S. Samueloff and M.K. Yousef. CRC Press, Inc. West Palm Beach, FL., pp. 121-130. 1987.
12. Davis, T.P. Methods of Measuring Neuropeptides and Their Metabolism. In: *Stress, Neuropeptides and Systemic Disease*. Edited by P.G. Kaufman, J.A. McCubbin and C.B. Nemeroff. Academic Press, Inc., Orlando, FL. Chapter 8., pp. 149-177. 1991.
13. Rittenbaugh, M. Aickin, T. Moon, T. Davis, E. Surwit and F. Meyskens, Jr., Dietary

- Factors in Cervical Dysplasia. Chemoimmuno Prevention of Cancer, 1st International Conference, Vienna, Austria. Edited by Ugo Pastorino and Waun Ki Hong. Thieme Medical Publishers, Inc., New York, pp. 65-72. 1991.
14. Knapp, R.J., T.P. Davis, T.F. Burks and H.I. Yamamura. Physiological and Pharmacological Evaluation of Peptide Analogues. In: *Peptide Pharmaceuticals: Approaches to the Design of Novel Drugs*. Chapter, 7 pp. 210-242. 1991.
 15. Davis, T.P. and R.B. Williams. Human Stress-Measurement and Consequences. In: *A Lunar-Based Chemical Analysis Laboratory*. Edited by: Cyril Ponnampuruma and Charles Gehrke. A. Deepak Publishing. Hampton, VA. pp. 204-208. 1992.
 16. Davis, T.P. and P. Konings. Peptidases in the CNS: Formation of Biologically Active Receptor Specific Peptide Fragments. In: *Critical Reviews in Neurobiology*. Edited by: C.B. Nemeroff and E.B. DeSouza CRC Press Inc. Volume 7 (3/4): 163-174. 1993.
 17. Davis, T.P. and S.L. Crowell. B-endorphin is metabolized *in vitro* by human small cell lung cancer to γ -endorphin which stimulates clonal growth. In: *Growth factors, peptides and receptors*. Edited by: Terry W. Moody. pp. 360-380. Plenum Press, N.Y. 1993.
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- Amer. Assoc. for Cancer Research (AACR). San Francisco, CA. March, 1994.
124. D.L. Green, V.S. Hau, S.J. Weber, T.J. Abbruscato, V.J. Hruby and T.P. Davis. Metabolic Conversion and *In Vitro* Blood-Brain Barrier Permeability of an Enkephalin Analog Pro-Drug. Society for Neuroscience Annual Meeting, Miami, FL. November 13-18, 1994.
 125. K. Gohil, T.J. Abbruscato, Jr., T. Singh, D. Silva, G. Miljanich, R. Newcomb, L. Nadasdi, and T.P. Davis. Blood-Brain Barrier Permeation and *In Vivo* Brain Receptor Occupancy of the Calcium Channel Blocker, SNX-111 (Synthetic ω -Conopeptide MV11A). Society for Neuroscience Annual Meeting, Miami, FL. November 13-18, 1994.
 126. T.J. Abbruscato, S.J. Weber, V.J. Hruby, and T.P. Davis. *In Vitro* and *In Vivo* Blood-Brain Barrier Permeability of MU Selective, Opioid Antagonist CTAP and Agonists DPDPE and Biphalin: Evidence for Improved Permeability by Halogenation. Society for Neuroscience Annual Meeting, Miami, FL. November 13-18, 1994.
 127. R. Day, W. Dong, T.P. Davis, T.G. Sherman, R.C. Thompson, N.G. Seidah. Hypothalamic Expression of the Prohormone Convertases: *In Situ* Hybridization Colocalization Studies. Society for Neuroscience Annual Meeting, Miami, FL. November 13-18, 1994.
 128. B.L. Mania-Farnell, I.W. Botros, and T.P. Davis. Regulation of Cholecystokinin mRNA by Retinoic Acid and β -Adrenergic Agents in Cell Lines. Society for Neuroscience Annual Meeting, Miami, FL. November 13-18, 1994.
 129. C.S. Konkoy and T.P. Davis. Regional Metabolism of Met-Enkephalin and CCK on Intact Rat Brain Slices: Characterization of Specific Peptidases. Society for Neuroscience Annual Meeting, Miami, FL. November 13-18, 1994.
 130. S.M. Waters, C.S. Konkoy and T.P. Davis. Substance P Metabolism on Intact Regional Brain Slices: Effect of Neuroleptic Administration. Society for Neuroscience Annual Meeting, Miami, FL. November 13-18, 1994.
 131. G. Li, W. Haq, I.A. Dillon, L. Xiang, R. Hughes, B. Lou, P. Davis, F. Porreca, T. Davis, M. Romanowski, X. Zhu, A. Misicka, A. Lipkowski, H.I. Yamamura, D.F. O'Brien, and V.J. Hruby. Structure-Activity Relationships and Synthetic Study for a Super Antinociceptive Peptide, Analogue Biphalin. Fourteenth American Peptide Symposium, Columbus, OH. June 18-23, 1995.
 132. J.-P. Meyer, F.-D. Lung, K. Lee, P. Davis, T. Gillespie, H.I. Yamamura, T.P. Davis, F. Porreca, and V.J. Hruby. Synthesis and Biological Activities of Enzymatically Stable and Highly Selective Dyn A(1-11)-NH₂ Analogs. Fourteenth American Peptide Symposium, Columbus, OH. June 18-23, 1995.
 133. V.J. Hruby, T.P. Davis, R. Polt, H. Bartosz-Bechowski, A. Misicka, A. Lipkowski, S.D. Sharma, X. Qian, G. Li, H.I. Yamamura, F. Porreca, and D.F. O'Brien. A Systematic Investigation of Factors that Enhance Penetration of the Blood Brain Barrier. Fourteenth American Peptide Symposium, Columbus, OH. June 18-23, 1995.
 134. T.J. Abbruscato, S.A. Williams, V.J. Hruby, and T.P. Davis. Blood-Brain Barrier Permeability of Novel Opioid Peptides using Brain Microvessel Endothelial Cells. Fifty-Seventh Annual Scientific Meeting of the College on Problems of Drug Dependence, Scottsdale, AZ. June 10-15, 1995.
 135. S.A. Williams, T.J. Abbruscato, V.J. Hruby, and T.P. Davis. Effect of Halogenation on the CNS Entry of DPDPE. Fifty-Seventh Annual Scientific Meeting of The College on Problems of Drug Dependence, Scottsdale, AZ. June 10-15, 1995.
 136. V.J. Hruby, N. Collins, J.-P. Meyer, F.-D. Long, D. Stropova, P. Davis, T. Davis, F. Porreca and H.I. Yamamura. Design of dynorphin A analogs with high potency and selectivity for κ or δ or μ receptors implications for opioid drug design. Fifty-Seventh Annual Scientific Meeting of the College on Problems of Drug Dependence, Scottsdale, AZ. June 10-15, 1995.

137. S.A. Williams, S.A., T.J. Abbruscato, L. Szabo, V. Hruby and T.P. Davis. Does glycosylated DCDC-enkephalin use the GLUT I carrier to enter the CNS? Cerebral Vascular Biology Conference, Paris, France. July 1995.
138. R.L. Polt, V. J. Hruby, F. Porreca, T. P. Davis, H. I. Yamamura and L. Szabo. Glycopeptide enkephalin analogs penetrate the blood-brain barrier to produce potent analgesia in mice after peripheral administration. Western Biotech Conference, October 18-21, 1995.
139. T.P. Davis, A. Erenberg, S.C. Moreau, J.E. Taylor, and T.J. Gillespie. Comparative distribution of somatostatin analogs to target tissues. Society of Neuroscience 26th Annual Meeting, Washington, DC. November 16-21, 1996.
140. T.J. Abbruscato, S.A. Williams, V.J. Hruby, T.P. Davis. Brain and spinal cord distribution of biphalin, correlation with opioid receptor density and mechanism of CNS entry. Society of Neuroscience 26th Annual Meeting, Washington, DC. November 16-21, 1996.
141. S.A. Williams, T.J. Abbruscato, V. Hau, T.J. Gillespie, J. Zsigo, V.J. Hruby and T.P. Davis. *In vitro* blood-brain barrier permeability and stability of a series of [D-ALA²] deltorphin I and II analogues¹. Society of Neuroscience 26th Annual Meeting, Washington, DC. November 16-21, 1996.
142. S.M. Waters, M.P. Rounseville and T.P. Davis. Effect of dopaminergic drugs on regional neuropeptidase activity and mRNA levels. Society of Neuroscience 26th Annual Meeting, Washington, DC. November 16-21, 1996.
143. S.M. Waters and T.P. Davis. Alterations of peptide metabolism and neuropeptidase activity in senile dementia of the Alzheimer's type. Joint meeting of the European Neuropeptide Club and the 17th Winter Neuropeptide Conference, Breckenridge CO. February 3-6, 1996.
144. T.J. Abbruscato and T.P. Davis. Protection of brain endothelial cell integrity by nifedipine during hypoxia. Society for Neuroscience 27th Annual Meeting, New Orleans, LA. October 25-30, 1997.
145. M.P. Rounseville and T.P. Davis. Differential expression of prohormone convertase genes in neuroendocrine tumors. Society for Neuroscience 27th Annual Meeting, New Orleans, LA. October 25-30, 1997.
146. R.D. Egleton and T.P. Davis. Endocytosis: A potential role in the transport of opioid peptides across the blood-brain barrier (BBB). Society for Neuroscience 27th Annual Meeting, New Orleans, LA. October 25-30, 1997.
147. T.P. Davis. The saturation kinetics of carrier mediated transport of peptide drugs to the CNS. Conference on Formulations and Drug Delivery II. Sponsored by: The American Chemical Society Division of Biochemical Technology, Controlled Release Society, Inc., La Jolla, CA. Oct. 5-8, 1997.
148. R.D. Egleton and T.P. Davis. The enkephalin analog [D-Pen², D-Pen⁵]enkephalin is transported into the brain by endocytosis. Conference on Formulations and Drug Delivery II. Sponsored by: The American Chemical Society Division of Biochemical Technology, Controlled Release Society, Inc., La Jolla, CA. October 5-8, 1997.
149. T.P. Davis and T.J. Abbruscato. Rapid hypoxia/aglycemia compromises *in vitro* blood-brain barrier integrity. Conference on Cerebral Vascular Biology, Gleneden Beach, Oregon. March, 1998.
150. T.P. Davis and R.D. Egleton. Transport of the delta-opioid receptor analgesic DPDPE across the BBB by endocytosis. Conference on Cerebral Vascular Biology. Gleneden Beach, Oregon. March, 1998.
151. T.J. Abbruscato, M.P. Rounseville and T.P. Davis. Alterations in endothelial cell / blood-brain barrier (BBB) phenotype after hypoxia/aglycemia. Society for Neuroscience 28th Annual Meeting. Los Angeles, CA. October, 1998.
152. R.D. Egleton, S.A. Mitchell, R. Polt, V.J. Hruby and T.P. Davis. Glycosylation improves the blood-brain barrier (BBB) permeability of an enkephalin analog. Society for Neuroscience 28th Annual Meeting. Los Angeles, CA. October, 1998.

153. M. P. Rounseville and T.P. Davis. C-MYB trans-activates the transcription of autocrine growth factor genes in small cell lung cancer. Society for Neuroscience 28th Annual Meeting. Los Angeles, CA. October, 1998.
154. T.J. Gillespie, J.E. Taylor, and T.P. Davis. Halogenation of opioid peptides alters their blood-brain barrier (BBB) permeabilities and octanol/saline distribution coefficients. Society for Neuroscience 28th Annual Meeting. Los Angeles, CA. October, 1998.
155. V.S. Hau, A. Lipkowski, V.J. Hruba, R.J. Huxtable and T.P. Davis. Effect of cationization on the *in vitro* stability and blood-brain barrier permeability of endomorphins. Society for Neuroscience 28th Annual Meeting. Los Angeles, CA. October, 1998.
156. C.L. Gentry, R.D. Egleton, V.J. Hruba, T.J. Gillespie and T.P. Davis. Halogenated enkephalin analogs show enhanced blood -brain barrier (BBB) permeability in an *in vitro* system. Society for Neuroscience 28th Annual Meeting. Los Angeles, CA. October, 1998.
157. K.A. Witt, R.D. Egleton and T.P. Davis. Insulin potentiates enkephalin analog permeability across the blood-brain barrier. Society for Neuroscience 28th Annual Meeting. Los Angeles, CA. October, 1998.
158. V.S. Hau, C. Campos, A. Lipokowski, V.J. Hruba and T.P. Davis. Endothelial cell uptake, blood-brain barrier permeability and *in vitro* stability of the cationic endomorphins. Experimental Biology 99, Washington, DC, April, 1999.
159. V.S. Hau, C. Campos, K. Hoshata, H. Yamamura, V. Hruba and T.P. Davis. Guanidino cationization effects on the blood-brain barrier permeability, *in vitro* stability and receptor binding of endomorphins. American Society for Medical Student Research, Carmel, CA, 1999.
160. T.W. Moody, J. Childs, E. Moody and T.P. Davis. SR48692 is a neurotensin receptor antagonist for small cell lung cancer cells. Society for Neuroscience 29th Annual Meeting. Miami, Florida, June, 1999.
161. S. Hom, R.D. Egleton, T.J. Abbruscato, P.A. St. John and T.P. Davis. Increased cerebrovascular permeability in an *in situ* model of hypoxia/aglycemia. Society for Neuroscience 29th Annual Meeting. Miami Beach, FL, October, 1999.
162. T.J. Abbruscato and T.P. Davis. Hypoxia/Aglycemia alterations in cytoskeletal and tight junctional proteins at the blood-brain barrier (BBB).
163. K.A. Witt, R.D. Egleton, and T.P. Davis. Effect of poly(oxyethylene)-poly(oxypropylene) block copolymer on opioid transport in the *in vitro* blood-brain barrier. Society for Neuroscience 29th Annual Meeting. Miami Beach, FL, October, 1999.
164. C.L. Gentry, T.J. Abbruscato and T.P. Davis. Nicotine and cotinine increase *in vitro* blood-brain barrier permeability. Society for Neuroscience 29th Annual Meeting. Miami Beach, FL, October, 1999.
165. R.D. Egleton, S.A. Mitchell, T.J. Gillespie and T.P. Davis. Glycosylation improves the blood-brain barrier (BBB) penetration of a linear opioid peptide analog. Society for Neuroscience 29th Annual Meeting. Miami Beach, FL, October, 1999.
166. T.J. Abbruscato, K.M. Venisnik and T.P. Davis. Hypoxia/Aglycemia alterations in junctional proteins at the blood-brain barrier (BBB). 43rd Annual Meeting of the Western Pharmacology Society, Westward Look Resort & Spa, Tucson, Arizona, January, 2000.
167. R.D. Egleton, S.A. Mitchell, J. Huber, T.J. Gillespie, R. Polt, and T.P. Davis. Glycosylation improves peptide bioavailability to the brain. 43rd Annual Meeting of the Western Pharmacology Society, Westward Look Resort & Spa, Tucson, Arizona, January, 2000.
168. K.A. Witt, R.D. Egleton, and T.P. Davis. Effect of block copolymer micellar microcontainers on opioid transport in the *in vitro* blood-brain barrier. 43rd Annual Meeting of the Western Pharmacology Society, Westward Look Resort & Spa, Tucson,

- Arizona, January, 2000.
169. V.S. Hau, K. Hosohata, A.W. Lipkowski, H.I. Yamamura, V.J. Hruby, and T.P. Davis. Cationic endomorphins: Assessment of *in vitro* stability, BBB permeability and endothelial cell uptake. 43rd Annual Meeting of the Western Pharmacology Society, Westward Look Resort & Spa, Tucson, Arizona, January, 2000.
 170. K.M. Venisnik, T.J. Abbruscato, B.T. Hawkins, and T.P. Davis. Nicotine and cotinine modulate *in vitro* and *in situ* blood-brain barrier permeability. 43rd Annual Meeting of the Western Pharmacology Society, Westward Look Resort & Spa, Tucson, Arizona, January, 2000.
 171. R.D. Egleton, J.D. Huber, C.R. Campos and T.P. Davis. Alteration of blood-brain barrier (BBB) transporter expression during diabetes in the rat. Society for Neuroscience, 30th Annual Meeting, New Orleans, LA, November 4-9, 2000.
 172. K.S. Mark and T.P. Davis. Re-oxygenation following hypoxia induces changes in brain endothelial cell architecture. Society for Neuroscience, 30th Annual Meeting, New Orleans, LA, November 4-9, 2000.
 173. J.D. Huber, K.A. Witt, S. Hom, R.D. Egleton, and T.P. Davis. Blood-brain barrier tight junction alteration induced by peripheral inflammatory pain. Society for Neuroscience, 30th Annual Meeting, New Orleans, LA, November 4-9, 2000.
 174. K.A. Witt, R.D. Egleton, J.D. Huber, M.J. Roberts, M.D. Bentley, L. Guo, and T.P. Davis. Assessment of pegylation and methylation as brain delivery methodologies. Society for Neuroscience, 30th Annual Meeting, New Orleans, LA, November 4-9, 2000.
 175. S. Hom, R.D. Egleton, T.J. Abbruscato, J.D. Huber and T.P. Davis. Effects of reduced perfusion flow on blood-brain barrier (BBB) transport systems. Society for Neuroscience, 30th Annual Meeting, New Orleans, LA, November 4-9, 2000.
 176. B.T. Hawkins, R.D. Egleton, J.D. Huber, C.R. Campos, and T.P. Davis. Acute and chronic effects of nicotine on ⁸⁶Rb⁺ uptake across the *in situ* blood-brain barrier of the rat. Society for Neuroscience, 30th Annual Meeting, New Orleans, LA, November 4-9, 2000.
 177. R.D. Egleton, J.D. Huber, C.R. Campos, R.C. Brown and T.P. Davis. Alteration of ion transporter expression at the choroid plexus of diabetic rats. Society for Neuroscience, 31st Annual Meeting, San Diego, CA, November 10-16, 2001.
 178. K.S. Mark, S. Hom, R.C. Brown, T.P. Davis. Blood-brain barrier, cytoarchitecture, immunofluorescence, hypoxia. Society for Neuroscience, 31st Annual Meeting, San Diego, CA, November 10-16, 2001.
 179. R.C. Brown, K.S. Mark, R.D. Egleton and T.P. Davis. Role of calcium in modulating blood-brain and blood-CSF barrier integrity after hypoxia/aglycemia. Society for Neuroscience, 31st Annual Meeting, San Diego, CA, November 10-16, 2001.
 180. K.A. Witt, K.S. Mark and T.P. Davis. Hypoxia/Re-oxygenation increases sucrose permeability at rat blood-brain barrier. Society for Neuroscience, 31st Annual Meeting, San Diego, CA, November 10-16, 2001.
 181. S. Hom, R.D. Egleton, K.S. Mark and T.P. Davis. Comparison of blood-brain barrier function and protein expression in SD, SKY and SHR rats. Society for Neuroscience, 31st Annual Meeting, San Diego, CA, November 10-16, 2001.
 182. B.T. Hawkins, R.C. Brown and T.P. Davis. Effects of chronic nicotine on blood-brain barrier ion transporter expression. Society for Neuroscience, 31st Annual Meeting, San Diego, CA, November 10-16, 2001.
 183. R.D. Egleton, C.R. Campos, J.D. Huber, S. Hom and T.P. Davis. Diabetes induces phosphorylation of choroid plexus NA⁺/K⁺ ATPASE. Society for Neuroscience, 32nd Annual Meeting, Orlando, FL, November 2-7, 2002.
 184. J.D. Huber, C.R. Campos, R.D. Egleton and T.P. Davis. Pain and the blood-brain barrier: Potential targets for tight junction modulation. Society for Neuroscience, 32nd Annual Meeting, Orlando, FL, November 2-7, 2002.
 185. K.S. Mark, A.R. Burroughs, T.P. Davis. Changes in nitric oxide (NO) levels during

- hypoxia and post-hypoxic reoxygenation in cerebral microvasculature. Society for Neuroscience, 32nd Annual Meeting, Orlando, FL, November 2-7, 2002.
186. R.C. Brown and T.P. Davis. Does calcium modulate tight junction protein expression at the blood-brain barrier after hypoxia? Society for Neuroscience, 32nd Annual Meeting, Orlando, FL, November 2-7, 2002.
 187. K.A. Witt, K.S. Mark, J.D. Huber, R.D. Egleton and T.P. Davis. Hypoxia treatment shows enhanced *in vivo* blood-brain barrier tight junction permeability associated with a shift in occludin protein band expression. Society for Neuroscience, 32nd Annual Meeting, Orlando, FL, November 2-7, 2002.
 188. B.T. Hawkins, R.C. Brown, R.D. Egleton, Y.P. Kuo, R.J. Lukas and T.P. Davis. Rat cerebral microvessels express nicotinic Acetylcholine receptors. Society for Neuroscience, 32nd Annual Meeting, Orlando, FL, November 2-7, 2002.
 189. S. Hom, R.D. Egleton, J.D. Huber and T.P. Davis. Alterations in blood-brain barrier permeability and cerebral blood flow induced by hypoxia-aglycemia with low flow brain perfusion. Society for Neuroscience, 32nd Annual Meeting, Orlando, FL, November 2-7, 2002.
 190. V.S. Hau, J.D. Huber and T.P. Davis. A cellular fractionation method to investigate blood-brain barrier tight junction protein translocation and post-translational modification. Society for Neuroscience, 32nd Annual Meeting, Orlando, FL, November 2-7, 2002.
 192. K.A. Witt, K.S. Mark, S. Hom and T.P. Davis. Acute hypoxia enhances blood-brain barrier tight junction permeability associated with inflammation and vasogenic edema in a biphasic manner. Society for Neuroscience, 33rd Annual Meeting, New Orleans, LA, November 8-12, 2003.
 193. K.S. Mark, A. Burroughs and T.P. Davis. Hypoxia-induced changes in brain microvessel endothelial cell nitric oxide synthase. Society for Neuroscience, 33rd Annual Meeting, New Orleans, LA, November 8-12, 2003.
 194. J.D. Huber, C.R. Campos and T.P. Davis. Immunohistochemical study of Cerebrovascular changes following carrageenan-induced inflammatory pain in the rat. Society for Neuroscience, 33rd Annual Meeting, New Orleans, LA, November 8-12, 2003.
 195. B.T. Hawkins, R.D. Egleton, and T.P. Davis. Peripheral nicotinic antagonism blocks nicotine-induced increases in blood-brain barrier permeability. Society for Neuroscience, 33rd Annual Meeting, New Orleans, LA, November 8-12, 2003.

F. BOOK REVIEWS

1. Davis, T.P., American Institute of Biological Sciences, "Heat Shock: From Bacteria to Man," by Schlessinger, Ashburner and Tissieris, 1983. *BioScience* 34, 9:590, 1984.
2. Davis, T.P., "Peptide Hormones as Prohormones: Processing, Biological Activity, Pharmacology." Edited by Jean Martinez. Review written for *Trends in Pharmacological Sciences* Vol. 10:424, 1989.

VII. MEDIA

A. INTERVIEWS

- 1981 Interview, NBC Television, "Effect of Heat on Your Health."
- 1982 Interview, KNXT Radio Station, "Effect of Tucson's Heat on Your Health."
- 1983 Interview KUAT Educational Television, "Effect of Heat on Non-Acclimated Individuals."
- 1987 Interview, KUAT Television, "Effect of Heat on Human Performance."
- 1988 Interview, KAET Television - Phoenix, "Alzheimers Disease Research - Advances in Neurochemistry."
- 1989 Interview, KUAT Radio - Tucson. "Neurochemistry of Alzheimer's Disease."

B. VIDEOTAPES-ONLINE

- 1987 Deans Clinical Rounds. "Neurochemistry of Alzheimers Disease." March 10, 1987. University of Arizona College of Medicine Clinical Conference.

- 1988 KAET Television - Phoenix. "Alzheimers Disease Research - Advances in Neurochemistry." 1988.
- 1999 University of Washington Medical School Colloquium Series on Biomedical Research Integrity - Seattle, WA. "Skills Integral to Good Laboratory Management." July 8, 1999.
- 2009 Henry Stewart Lecture Series. Davis, T. (2009), "Blood-brain barrier in health and disease", in Kastin, A. and Pan, W. (eds), The Blood-Brain Barrier: Understanding the regulatory gatekeeper between brain and body, The Biomedical & Life Sciences Collection, Henry Stewart Talks. London. <http://www.hstalks.com/?t=BL0381811-Davis>

VIII. SCHOLARLY PRESENTATIONS

A. COLLOQUIA

- 1981 Colloquium, Lederle Pharmaceuticals, Pearl River, New York. Invited presentation on, "Pharmacology of Antineoplastic Drugs."
- 1989 Invited NASA Colloquium Speaker, "Requirements for Measuring Indices of Human Stress on a Lunar-Based Chemical Analysis Laboratory (LBCAL)." IX College Park Colloquium, University of Maryland, College Park, MD, October 30-31, 1989.

B. INVITED SEMINARS

- 1980 Invited Speaker, Perkin-Elmer Corp., Norwalk, Conn. Invited Seminar on, "Biogenic amine analysis using reversed-phase liquid chromatography."
- 1981 Invited Speaker, University of Arizona, Alpha Epsilon Delta. "Alternate Careers in Biomedical Research."
- 1981 Department of Physiology, University of Arizona Health Sciences Center, Tucson, Arizona. Seminar on, "Exercise in the Desert: Effect of Heat on Thermoregulation."
- 1982 Invited Speaker, Department of Biological Sciences, University of Nevada, Las Vegas. Invited seminar on, "Peptides and Amines: Function in Thermoregulation."
- 1982 Invited Seminar, Lederle Pharmaceuticals, Pearl River, New York. Invited presentation on, "Pharmacology of Antineoplastic Drugs."
- 1982 Department of Biological Sciences, University of Arizona, Tucson, Arizona. Invited Seminar on, " β -endorphin Processing in the Brain: Thermoregulation Effects."
- 1982 Department of Pharmacology/Toxicology, University of Arizona College of Pharmacy, Tucson, AZ. Invited Seminar on, "Peptide Research Advances."
- 1983 Animal Physiology Graduate Group, University of Arizona, Tucson, Arizona. Invited Seminar on " β -endorphin Processing in the Gut: Motility Effects."
- 1984 Invited Seminar, Abbott Laboratories, Dallas, Texas. January 26-28, Invited seminar/lecture on "Characterization of *In Vitro* Central β -endorphin Metabolism in Neuropsychiatric Diseases."
- 1984 Invited Seminar, Hansen's Natural Foods, Inc., Los Angeles, CA, February 28-29. Invited lecture on, "Isolation of Proteins and Peptides from Plants by Liquid Chromatography."
- 1984 Invited Seminar, University of Nevada. June 25, Invited lecture on, "Central Processing of β -endorphin: Effect of Neuroleptic Drugs."
- 1984 Invited Speaker, AKRAS Chemical Co., Vienna, Austria. July 19-20, Invited seminar on the "Use of Chromatographic Techniques in the Isolation of Pharmaceutical and Food Flavors."
- 1984 Invited Seminar, Laboratoires D'Etudes t de Recherches Synthelabo, Paris, France. July 27-30, Invited by Dr. Hans Schoemaker to discuss, "Effect of centrally acting drugs on endorphin processing in normal and diseased tissue."
- 1985 Invited Speaker, University of Nevada, March 1. "Implications of Central Processing of Opioid Peptides."
- 1985 Invited Seminar, Department of Neurology, University of Arizona College of Medicine. "Implications of Central Peptide Processing and Mental Illness." September 6, 1985.

- 1985 Invited Seminar, University of Arizona Center for Separation Sciences, May 13, 1985. Invited lecture on, "Peptide Separations in Biological Tissues."
- 1985 Invited Seminar, National Bureau of Standards, Washington, DC, April 10-12, on "Ascorbic Acid Analysis in Stabilized and Non-stabilized Samples."
- 1986 Invited Seminar, Organon Pharmaceutical Company, Scientific Development Group, OSS - The Netherlands. "Effect of Centrally Acting Drugs on β -endorphin Processing." June 20, 1986.
- 1986 Invited Seminar, Rudolf Magnus Institute for Pharmacology, University of Utrecht, The Netherlands. "Effect of Centrally Acting Drugs on *In Vitro* Central β -endorphin Metabolism." June 23-27, 1986.
- 1987 Invited Seminar, Department of Chemical Engineering, University of Arizona. "Bioseparation Techniques for Chemical Engineers." March 16, 1986.
- 1988 Invited Seminar, University of Arizona College of Medicine. "Implications of Neuropeptide Processing." February 18, 1987.
- 1988 Invited Speaker, Rincon Optimist Club, Tucson, Arizona. March 30, 1988. "Alzheimers Disease and Dementia - Chemical Changes and Aging."
- 1990 Invited Seminar, Analytical Biochemistry Labs, Columbia, Missouri, March 1, 1990. "Strategies for New Analytical Programs in Peptides and Proteins."
- 1990 Invited Seminar, Rudolf Magnus Institute for Pharmacology, University of Utrecht, The Netherlands, July 12, 1990. "Neuropeptide Processing."
- 1990 Invited Seminar, Duke University Medical Center, Department of Pharmacology. "Neuropeptide Regulation by Peptidases," Durham, NC, August 27-29, 1990.
- 1991 Invited Seminar, University of Arizona College of Medicine Committee on Aging Research. "Alterations in Specific Regional Neuropeptidases in Alzheimers Disease - Effect of Post-Mortem Interval." November 5, 1991.
- 1992 Invited Seminar. Barrow Neurological Institute, Phoenix, AZ. "Effect of Antipsychotics on Neurotensin and β -Endorphin Metabolism." March 12, 1992.
- 1992 Invited Seminar. "Effect of Protease Inhibitors on Small Cell Lung Cancer Growth." National Cancer Institute, Bethesda, MD. May 29, 1992.
- 1993 Invited Seminar Speaker. "Metabolic Half-Life of Somatostatin and Substance P are Altered in Alzheimers Disease". Synthelabo Research Institute, Paris, France. March 29, 1993.
- 1993 Invited Seminar Speaker. "Conformationally Constrained Enkephalin and the Blood Brain Barrier." Neurex Corporation, Palo Alto, CA. July 9, 1993.
- 1993 Invited Seminar. "Gastrointestinal Processing of Neuropeptides: Effect on Function." Department of Physiology. University of Arizona College of Medicine. Tucson, AZ. October 8, 1993.
- 1994 Invited Seminar Speaker. "Metabolic Stability and Tumor Inhibition of Bombesin/GRP Receptor Antagonists." Selectide Corporation, Oro Valley, AZ. April 7, 1994.
- 1994 Invited Seminar Speaker. "Neurotensin as a Negative Autocrine Factor in Prostate Cancer." National Cancer Institute, NIH, Bethesda, MD. May 23, 1994.
- 1995 Invited Seminar Speaker. "*In Vitro-In Vivo* Blood Brain Barrier Permeability Correlations of Receptor Selective Opioid Peptides." Parke-Davis Pharmaceutical Research, Ann Arbor, MI. March 23, 1995.
- 1997 Invited Seminar Speaker. "The Saturation Kinetics of Carrier Mediated Transport of peptides to the CNS." Emory University School of Medicine, Department of Biochemistry, Atlanta, GA. May 8, 1997.
- 1997 Invited Seminar Speaker. "Peptide drug distribution across the blood-brain and blood-cerebrospinal fluid barrier." Parke-Davis Pharmaceutical Research, Ann Arbor, MI. July 23, 1997.
- 1998 Invited Seminar Speaker. "Anatomy, Physiology and Pharmacology of the Blood-Brain Barrier." Iowa State University, Ames, Iowa. May 14, 1998.
- 1998 Invited Seminar Speaker. "Peptide pharmaceuticals and their delivery across the

- blood-brain barrier.” Washington State University College of Pharmacy, Pullman, WA. July 9-11, 1998.
- 1998 Invited Seminar Speaker. “Transport of peptide pharmaceuticals across the blood-brain barrier.” University of Nebraska College of Medicine, Omaha, Nebraska. October 15-17, 1998.
- 2001 Invited Seminar Speaker. “Advances in the delivery of peptide neuropharmaceuticals to the brain.” Biomeasure Neuropharm. Boston, MA. April 12-13, 2001, 2001.
- 2001 Invited Seminar Speaker. “Use of biopolymers for the delivery of protein therapeutics to the brain.” Elan Pharmaceutical. Dublin, Ireland. August 6-9, 2001.
- 2002 Invited Seminar Speaker. “The Importance of Scientific and Research Integrity in Biomedical Investigations.” Research Institute of Children’s Hospital, U.S.C., Los Angeles, California. August 16, 2002.
- 2004 Invited Seminar Speaker. " Responsible Conduct in Research in Biomedical Investigations." Texas Tech University Health Sciences Center, College of Pharmacy. Amarillo, Texas. September 6-7, 2004.
- 2005 Invited Seminar Speaker. " Hypoxia/Aglycemia/Stroke and the Neurovascular Unit-Importance of the blood brain barrier". Texas A & M College of Medicine, College Station, Texas. April 14, 2005.
- 2005 Invited Speaker. " Mentoring: The Currency of an Academic Researcher". Tucson Sunrise Rotary Club, Tucson, Arizona. July 21, 2005.
- 2006 Invited Seminar Speaker, " The blood brain barrier in health and disease". The Department of Medical Physiology, University of Missouri, Columbia, Missouri. November 8, 2006.
- 2007 Invited Speaker, “The Blood- Brain Barrier and Biomedical Research”, Jackson Rotary Club, Jackson, WY. August 28, 2007.
- 2010 Invited Speaker, “ The Blood Brain Barrier in Health and Disease”. St. Jude’s Children’s Hospital , Memphis, TN. April 22, 2010.
- 2010 Invited Speaker, “Etiology of Alzheimers Disease”, Jackson Rotary Club, Jackson, WY. July 15, 2010.
- 2010 Invited Speaker, “ Role of 3K3A-Activated Protein C as a Cytoprotectant in the Brain”, Laureate Pharmaceutical LLC., Princeton, New Jersey. September 9, 2010.
- 2012 Invited Speaker, “ Protein trafficking of P-glycoprotein and occludin as targets for drug delivery at the neurovascular unit”, Harvard University Neuroscience Program, Mass. General Hospital. June 14, 2012.
- 2012 Invited Speaker, “PgP Trafficking at the BBB: Effect of Pain and Target for Therapy”. Gordon Research Conference, “ Barriers of the CNS”. Colby-Sawyer College. June 21, 2012.
- 2015 Invited Speaker, “ Trafficking of transporter proteins at the BBB/NVU as targets for drug delivery to the CNS – Effect of Pain on PgP ”. Department of Neurosurgery and Neuroscience, MGH/Harvard Medical School. Sept. 23, 2015.
- 2016 Invited Honorary Speaker, Colloquium. Department of Pharmaceutical Sciences, Division of New Drug Development and Delivery. Univ. of Wisconsin-Madison, WI. April 21 to 23, 2016. “ PgP trafficking as a target for drug delivery “.
- 2018 Invited Seminar Speaker. “How pain influences the blood brain barrier”. Mass General Hospital / Harvard Medical School. Department of Neurology. June 22, 2018.
- 2019 Invited Seminar Speaker and Consultant . “How pain influences drug delivery at the blood brain barrier”. Alkermes Pharmaceutical Company. Waltham, MA. June , 2019.

C. SYMPOSIA-INVITED AND CHAIRED

- 1981 Invited Speaker, Waters Associates, Western Chromatography Symposium. "Mass Spectrometry and Pharmacokinetics of Anti-Cancer Drugs," Newport Beach, CA.
- 1981 Symposium Chairman, “Liquid Chromatography as a Research Tool in Peptide and Amine Pharmacology.” American Society of Pharmacology and Experimental

- Therapeutics, Fall Meeting, Calgary, Alberta, Canada.
- 1983 Invited Symposium Presentation, 8th American Peptide Symposium, Tucson, AZ.
- 1984 May 22-27. "Characterization of β -endorphin Processing by Reversed-Phase Liquid Chromatography."
- 1984 Symposium Chairman, "Endorphins and Enkephalins." American Society for Pharmacology and Experimental Therapeutics Meeting, Chicago, IL. April 11, 1983. FASEB.
- 1984 Invited Symposium Speaker, American Industrial Hygiene Association, Arizona Center for Occupational Safety and Health, School of Health Related Professions. April 9-12, "Principles of Gas Chromatography for Real Time Air Monitoring in the Industrial Environment."
- 1984 Invited Symposium Speaker, International Union of Physiological Sciences (IUPS) Symposium, Jerusalem, Israel. August 26-31. "Central Processing of Brain Peptides and Adaptation to the Environment."
- 1985 Invited Symposium Speaker. "Use of reversed-phase HPLC in analysis of peptide processing." Presented at Fourth International Symposium on HPLC of Proteins, Peptides and Polynucleotides, Baltimore, MD. Dec. 10-12, 1984.
- 1985 Invited Symposium Speaker. "Effect of proenkephalin A and proopioidmelanocortin processing fragments on motility in the small intestine." Presented at Tenth International Symposium on Gastrointestinal Motility." Rochester, MN. September 8-11, 1985.
- 1985 Invited Symposium Speaker. "Central processing and *in vitro* activity of opioid peptides." Presented at Washington Spring Symposium on Neural and Endocrine Peptides and Receptors, Washington, DC. May 28-31, 1985.
- 1986 Invited Symposium Speaker, National Bureau of Standards. Washington, D.C. "Advantages and Disadvantages of Single - and Multi-Vitamin Analytical Methods." May 28-29, 1986.
- 1987 Invited Symposium Speaker, Committee on Gerontology Research Forum. University of Arizona, College of Nursing, December 4, 1987. "Neurochemical Alterations in Alzheimer's Disease."
- 1988 Symposium Chairman, Session on "Measurement and Pharmacology of Chemoprevention," January 12-15, 1988. Tucson, AZ.
- 1988 Symposium Chairman, Session on "Milestones in Environmental Physiology," International (IUPS) Symposium on Age, Body Hydration and Stressful Environments. April 30 to May 1, 1988. Las Vegas, NV.
- 1988 Invited Symposium Speaker, International Union of Physiological Sciences (IUPS). "Symposium on Age, Body Hydration and Stressful Environments." April 30 - May 1, 1988. Las Vegas, NV.
- 1989 Invited Symposium Speaker, Arizona Society of Medical Technologists Annual Meeting, Tucson, AZ. "Recent Advances in Neurochemistry of Alzheimer's Disease." April 27, 1989. Tucson, AZ.
- 1989 Symposium Chairman, "Endorphins and Enkephalins: Peripheral Functions." American Society for Pharmacology and Experimental Therapeutics Annual Meeting, Salt Lake City, UT. August 14-19, 1989.
- 1989 Invited NASA Symposium Speaker, "Requirements for Measuring Indices of Human Stress on a Lunar-Based Chemical Analysis Laboratory (LBCAL)." IX College Park Colloquium, University of Maryland, College Park, MD. October 30-31, 1989.
- 1990 Invited Symposium Speaker, XI Winter Neuropeptide Conference, February 5-9, 1990. "Neurotensin and β -endorphin May Function as Regulatory Peptides in Small Cell Lung Cancer." Breckenridge, CO.
- 1990 Invited Symposium Presentation, XI Annual Conference of Indian Academy of Neurosciences, March 16-18, 1990. "The Effect of Conformation and Sequence on Neuropeptide Processing in Regional Brain Slices," Central Drug Research Institute, Lucknow, India.

- 1990 Invited Symposium Presentation, Satellite Symposium of the XIth International Congress of Pharmacology, June 30, 1990. "CNS Effects of Stress Hormones and Neuropeptides," De Forumzaal, RAI Congress Center, Amsterdam, The Netherlands.
- 1992 Invited Panel Discussant, 3rd Biology of Neurological Disease Symposium. "Parkinson's Disease and Related Disorders: Prevention, Pathogenesis and Treatment." April 15, 1992. University of Arizona College of Medicine.
- 1992 Symposium Co-Chairman and Speaker, 13th Annual Winter Neuropeptide Conference, February 1-5, 1992. "The Effect of Peptide Structure on Blood Brain Barrier Distribution." Breckenridge, CO.
- 1992 Symposium Chairman and Member of Program Committee, Spring Symposium on "Growth Factors, Peptides and Receptors." George Washington University, Washington University, Washington DC. June 1-5, 1992.
- 1992 Invited Chairman, Session on "Peptides: Biosynthesis, and Metabolism." 22nd Annual Society for Neuroscience Meeting, Anaheim, CA. October 25-30, 1992.
- 1993 Invited Session Chair, Symposium on "Peptides and the Blood-Brain Barrier." 14th Annual Winter Neuropeptide Conference February 6-9, 1993. Breckenridge, CO.
- 1993 Invited Chair, Session on "Peptides: Receptor Physiology." 23rd Annual Society For Neuroscience Meeting, Washington DC. November 7-12, 1993.
- 1994 Invited Chair, Session on "Peptides, Biosynthesis and Metabolism." 24th Annual Society for Neuroscience Meeting, Miami Beach, FL. November 13-18, 1994.
- 1994 Invited Chair, Session on "Peptides: Receptor Physiology." 25th Annual Society for Neuroscience Meeting, San Diego, CA. Nov. 15-20, 1995.
- 1996 Invited Chair, Session on "Peptides, Biosynthesis and Metabolism." 26th Annual Society for Neuroscience Meeting. San Diego, CA. November 20-25, 1996.
- 1997 Invited Chair, Session on "Peptides, Biosyntheses and Metabolism." 27th Annual Society for Neuroscience Meeting. New Orleans, LA. October 25-30, 1997.
- 1997 Invited Chair, Session on "Peptides: Receptor Up & Down Regulation." 27th Annual Society for Neuroscience Meeting. New Orleans, LA. October 25-30, 1997.
- 1999 Invited Session Chair, "Neuropharmaceutical drug delivery across the blood-brain barrier - Advances and current concepts." Summer Neuropeptide Conference, Key West, FL, June 27 to July 1, 1999.
- 1999 Invited Session Chair, Gordon Research Conference, "Barriers of the Central Nervous System." Tilton, NH. August 15-20, 1999.
- 2001 Invited Session Chair, "Pathologies and the Blood-Brain Barrier." Fourth International Meeting of Cerebral Vascular Biology, Cambridge University, Cambridge, England. April 5-10, 2001.
- 2002 Invited Session Chair, Gordon Research Conference, "Barriers of the Central Nervous System." Tilton, NH. July 10-16, 2002.
- 2003 Invited Session Chair, Fifth International Conference of Cerebral Vascular Biology, "Cell Biology and BBB Regulation." Texas Tech University, Amarillo, TX. June 15-19, 2003.
- 2004 Invited Session Chair, Gordon Research Conference, "Barriers of the Central Nervous System". Tilton, N.H. June 29 to July 2, 2004.
- 2006 Vice Chair, Gordon Research Conference, " Barriers of the Central Nervous System". June 25-30, 2006. Tilton School, Tilton, N.H.
- 2007 Invited Session Chair and Speaker, International Society for Stroke Research, San Francisco, California. "Proteins of the Tight Junction at the BBB" April, 2007.
- 2008 Elected Meeting Chair, Gordon Research Conference, " Barriers of the CNS" Tilton, New Hampshire. June 17-22, 2008.
- 2010 Invited Session Chair , Spring Brain Conference. " Matrix and Neurovascular Biology of the Stressed Brain". Omni Tucson National, Tucson, Arizona. March 17 to 18, 2010.
- 2010 Invited Session Chair. Gordon Research Conference. " Barriers of the Central

- Nervous System.” Colby-Sawyer College, New Hampshire. June 20-25, 2010.
- 2013 Invited Session Chair, ISCBFM. Brain 2013, “ Tools to Study the Blood Brain Barrier/Neurovascular Unit ”. Shanghai, China. May 20 to 25, 2013.
- 2014 Invited Symposium Chairman. “Interweaving Advances in Brain-Barriers Pharmacology with Clinical Problems : Implications for Treatment”. 20th Annual Blood-Brain Barrier Consortium Meeting. March 20 to 22, 2014. Sunriver, Oregon.
- 2014 Invited Workshop Panelist. “ Small Blood Vessels: Big Health Problems ? ” NIH/NINDS Workshop. John Edward Porter Neuroscience Research Center, Bethesda, MD. September 18 and 19, 2014.
- 2015 Invited Speaker and Panelist. International Cerebral Blood Flow and Metabolism Meeting . “Brain 2015”, June 27-30, 2015. Vancouver, BC.
- 2016 Invited Plenary Speaker . American Association of Pharmaceutical Scientists (AAPS) “Transporters at the BBB” Symposium. Baltimore, MD. April 18-20, 2016. “Trafficking of P-gP in Pain States”.
- 2017 Invited Session Organizer and Speaker. International Cerebral Blood Flow and Metabolism (ICBFM) Meeting. Brain 2017. “Neurovascular transporter mechanisms targeted for drug delivery”. April 1 to 4, 2017. Berlin, Germany.
- 2019 Invited Speaker. Gordon Research Conference (GRC). “Translating multifaceted molecular mechanisms into pharmacological interventions for advancing global health.” “Chronic Morphine and Pain alter trafficking of P-glycoprotein at the BBB/NVU - A Mechanism for Enhanced Drug Delivery.” Luca, Barga. Italy. April 28 - May 3, 2019.
- 2019 Invited Symposium Organizer, Symposium Chair, Education Platform Program Moderator and Platform Speaker. International Cerebral Blood Flow and Metabolism (ICBFM) Meeting. Brain 2019. “Interrogation of Pericyte Function in CNS Physiology and Pathophysiology” July 4 - 7, 2019. Yokohama, Japan.

D. INVITED CONFERENCES/PLENARY SPEAKER

- 1981 Invited Conference Participant, "Dopamine metabolites as markers of melanoma." Third Annual Conference on Melanoma, Chiricahua Mountains, AZ. April 8-10, 1981.
- 1982 Invited Conference Presentation, "Pharmacokinetics of 13-cis-retinoic acid (13-cRA) in patients with advanced cancer." Presented at International Conference on the Modulation and Mediation of Cancer by Vitamins, University of Arizona College of Medicine, February 22-25, 1982.
- 1982 Panel Member, University of Arizona Medical Center Forum, "Tucson's Heat and Your Health." University of Arizona College of Medicine, Tucson, AZ.
- 1983 Invited Participant, Gordon Research Conference on Medicinal Chemistry. August 1-5, Colby-Sawyer College, New London, NH.
- 1986 Invited Plenary Speaker, Fruchtasft - Woche 1986. Boblingen, West Germany. "Development of Novel Low Calorie Beverages." April 8-10, 1986.
- 1986 Invited Conference Presentation, "Peptide E is mu selective and metabolized to a novel fragment which lacks an amino terminal tyrosine but is delta opioid selective." International Narcotics Research Conference, Adelaide, Australia, August 31-September 4, 1987.
- 1987 Invited Plenary Speaker and Panel Member, The Dean's Clinical Rounds. "Neurochemistry of Alzheimers Disease." March 10, 1987. The University of Arizona College of Medicine Clinical Conference.
- 1988 Invited Conference Presentation and Co-Chairman, "Serum and tissue pharmacology of vitamin A and β -carotene." Third International Conference on Prevention of Human Cancer: Chemoprevention, January 10-15, 1988. Tucson, AZ.
- 1990 Invited Conference Speaker, XI Winter Neuropeptide Conference, February 5-9, 1990. "Neurotensin and β -endorphin May Function as Regulatory Peptides in Small Cell Lung Cancer. Breckenridge, CO.
- 1990 Invited Plenary Speaker, Conference Presentation, XI Annual Conference of Indian Academy of Neurosciences, March 16-18, 1990. "The Effect of Conformation and

- Sequence on Neuropeptide Processing in Regional Brain Slices," Central Drug Research Institute, Lucknow, India.
- 1991 Invited Conference Speaker, Joint FASEB Summer Conference/International Narcotic Research Conference. "Metabolism of Opioid Peptides in CNS and Periphery." Copper Mountain, CO. June 30-July 5, 1991.
- 1992 Invited Plenary Speaker, XII Annual Washington Spring Symposium on "Growth Factors, Peptides and Receptors." George Washington University, Washington, DC. June 1-5, 1992.
1993. Invited Plenary Speaker, "Biodistribution of Peptides Stabilized against Biodegradation". Keystone Symposium on "Prospects and Progress in Drug Design Based on Peptides and Proteins. Taos, NM. March 8-14, 1993.
- 1993 Invited Plenary Speaker, "Stress, Neuropeptides and The Long Term Effect of Stress". International Conference on Space Exploration and the Future of Man in Space. Dijon, France. March 30-April 4, 1993.
- 1993 Invited Plenary Speaker, "Conformationally Constrained Peptide Drugs Targeted at the Blood Brain Barrier". N.I.D.A Technical Review Meeting on "Membranes and Barriers: Targeted Drug Delivery. N.I.H Bethesda, MD. September 28-29, 1993.
- 1995 Invited Plenary Speaker, "In Vitro-In Vivo Blood Brain Barrier Permeability Correlations of Receptor Selective Opioid Peptides." Congress on In Vitro Biology. Denver, CO. May 20-24, 1995.
- 1995 Invited Plenary Speaker and Chairman, "Blood-Brain barrier permeability of conformationally constrained peptides." IBC Conference on Peptides and Proteins Targeted at the Blood-Brain Barrier. San Diego, CA. Sept., 1995.
- 1997 Invited Plenary Speaker, "Saturation Kinetics of Carrier Mediated Transport of Peptide Drugs to the CNS." Conference on Formulations and Drug Delivery II. La Jolla, CA. October 5-8, 1997.
- 1999 Invited Plenary Speaker, "Chromatography of Drugs that Cross the Blood-Brain Barrier." National A.C.S. Meeting, Anaheim, CA, March 24, 1999.
- 1999 Invited Plenary Speaker, "Management and the Recording of Research Data," Biomedical Research Integrity (BRI) Series, University of Washington School of Medicine, Seattle, WA, July 8-9, 1999.
- 2000 Invited Plenary Moderator, "Session on Laboratory Management." Burroughs - Wellcome Fund Annual Meeting, Coronado, CA, July 22-24, 1999.
- 2001 Invited Plenary Speaker, "Optimizing Peptide Drugs for CNS Delivery." Fourth International Conference on Cerebral Vascular Biology, Cambridge University, Cambridge, England, April 1-5, 2001.
- 2003 Invited Plenary Speaker, "Model Systems in Animals to Study Drug Delivery to the Brain." Fifth International Conference on Cerebral Vascular Biology, Texas Tech University, Amarillo, Texas. June 15-19, 2003.
- 2004 Invited Plenary Speaker, New Frontiers in Translational Research in Neuro-Oncology and the Blood-Brain Barrier. "Effect of hypoxia/reoxygenation on the blood brain barrier". Sunriver, Oregon. March 17-20, 2004.
- 2007 Invited Plenary Speaker, International Society for Stroke Research Annual Meeting. "Proteins of the Tight Junction of the Blood Brain Barrier". San Francisco, CA. April, 2007.
- 2007 Invited Plenary Speaker, International Meeting of Cerebral Blood Flow and Metabolism Society, "The Blood Brain Barrier and Neurovascular Unit" Osaka, Japan. May, 2007.
- 2009 Invited Plenary Speaker, International Meeting on "Signal Transduction at the Blood Brain Barrier". "Pathology at the Blood Brain Barrier." University College, London, England. September 9-11, 2009.
- 2010 Invited Plenary Speaker and Chair of Session, International Stroke Meeting of the American Heart Association. "Physiology and Pathology of the Blood Brain Barrier". San Antonio, Texas. February 24 - 27, 2010.

- 2011 Invited Symposium Speaker, American Society for Neurochemistry. "Blood Brain Barrier Dysfunction in Neurological Disease". St. Louis, MO. March 19-23, 2011.
- 2011 Invited Plenary Speaker. "The Neurovascular Unit", Teaching Session for Brain - Brain 2011-- International Congress, Barcelona, Spain. May 24-28, 2011.
- 2012 Invited, Featured Symposia Speaker, EB 2012, American Physiological Society (APS) and American Society for Medical Research (AFMR). "The Neurovascular Unit in Health and Disease" (APS). "A Leaky BBB: Occludin Oligomeric Assemblies altered by Pain and Hypoxic Stress" (AFMR). San Diego, CA. April 21-25, 2012.
- 2012 Invited Symposium Speaker, EB 2012, American Society for Pharmacology and Experimental Therapeutics, (ASPET), "Drug Delivery across the BBB in Disease States". San Diego, CA. April 21-25, 2012.
- 2012 Invited Keystone Speaker, Gordon Research Conference, "Barriers of the CNS". "The Blood Brain Barrier : Obstacle or Target for Drug Delivery to the Brain ". Colby-Sawyer College. New London, NH. June 16, 2012.
- 2013 Invited Conference Speaker, 22nd European Stroke Conference 2013. "Phase one Safety, Tolerability and Pharmacokinetics of 3K3A-Activated Protein C in Healthy Adult Volunteers." London, England.
- 2014 Invited Symposium Speaker. "P-glycoprotein and occludin trafficking as therapeutic targets to optimize CNS drug delivery". 20th Annual Blood-Brain Barrier Consortium Meeting. March 21 to 23, 2014. Sunriver Resort and Conference Center, Oregon.
- 2016 Invited Gordon Research Conference (GRC) Conferee at , "Barriers of the CNS", Colby Sawyer College, New London, NH. "Post translational PgP regulation at the BBB in response to acute peripheral pain ". June 25 to 29, 2016.
- 2017 Invited Symposium Speaker, International Stroke Conference. American Heart Association. "Penetrating the Blood Brain Barrier". Houston, Texas. February 22, 2017.
- 2018 Invited Participant and Presentor. "PgP Trafficking in Pain". Gordon Research Conference. Barriers of the CNS. Colby-Sawyer College. NH. June 17 to 20, 2018.
- 2018 Invited Symposium Chair and Speaker. American Neurological Association (ANA). "How pain influences the function of the blood brain barrier". Atlanta, GA. October 20-23.

IX. GRANTS & CONTRACTS WON (Completed \$ 40 Million in Direct Costs Alone from NIH)

A. GOVERNMENT (Continually Funded by NIH since 1981):

1. INACTIVE (Direct Costs \$30 million shown below. Total grant dollars as PI = \$45 million.)

\$5,000. N.I.H. 1980-1981. Cancer Center Core Developmental Grant. Thomas P. Davis, P.I. Analytical Pharmacology Laboratory Start-up.

\$15,000. N.I.H. 1981-1982. Biomedical Research Support Grant. Thomas P. Davis, P.I. Develop Analytical Laboratory to Pursue Neuropeptide Research Projects in Gastrointestinal System and Brain.

\$370,950. N.I.H. - P01-CA 23074. 1981-1987. Cancer Center Core Program Project Grant. Analytical Chemistry Cancer Core Reference Laboratory. Thomas P. Davis, P.I. of Core. Develop Research Analytical Methodology for Anticancer drugs and Metabolites. Isolate and Characterize Micronutrient Markers in Chemoprevention Studies from patients.

\$19,587. N.I.H. - N.I.A R-21- AG-04439. 1984-1985. Errors in Substance P Metabolism in Aging. Thomas P. Davis, P.I. Study the effect of Alzheimer's disease on the metabolism of substance P in post-mortem human tissue from various regions of the brain known to be effected.

\$6,530. N.I.H. - B.R.S.G. 1985-1986. Synthesis and Characterization of Pharmacologically Active Neuropeptides. Thomas P. Davis, P.I. This grant is to provide support for the synthesis of biologically active peptides for our research projects.

\$9,967. Walter Reed Army Institute, Washington, D.C. 1988-1990. Thomas P. Davis and Frank Porreca, P.I.'s. Isolation and characterization of CSF proteins implicated in seizures.

\$28,000. N.I.H. 1989-1990. Biomedical Research Support Grant; Small Instrumentation Grant

Program; Multi-User Liquid Scintillation Counting System. Thomas P. Davis, Co-investigator. **\$250,340. N.I.H. R-01-CA 44869.** 1988-1992. Thomas P. Davis, P.I. Metabolism of Autocrine Peptides in Small Cell Lung Cancer. This grant was designed to study and develop potential inhibitors of small cell lung cancer growth by inhibiting the formation of specific autocrine peptide hormones produced by the SCLC cells.

\$5,000. University of Arizona Foundation. 1988-1989. Thomas P. Davis, P.I. Central Metabolism of Somatostatin and Substance P is Altered in Alzheimer's Disease. This grant is designed to study the alterations in enzymatic metabolism in Alzheimer's disease.

\$150,000. N.I.H. P01-CA 17094. 1988-1993. Medical Oncology Program Project Grant. Sydney E. Salmon, P.I., Thomas P. Davis, Co-investigator. Study Pharmacokinetics of New Antineoplastic Agents (drugs).

\$528,587. N.I.H. P01-DK 36289. 1986-1994. Gastrointestinal Pharmacology and Peptide Processing. Thomas P. Davis, P.I. of Section and Co-Director of Program Project Grant. Grant funded to study gastrointestinal control by neuropeptides. My project was to study the regulation of CCK and GRP mRNA, processing and metabolism by steroid hormones, peptides and drugs in the CNS and periphery.

\$58,500. N.I.D.A. P01-DA06284-02S1. 1990-1994. Thomas P. Davis, P.I. and Sponsor. Pre-doctoral Fellowship to Mary Morrill-Supplement for Underrepresented Minorities in Biomedical Research .

\$72,000. Arizona Disease Control Research Commission (ADCRC). 1991-1994. Thomas P. Davis, P.I. This grant studied the alterations of somatostatin and substance P metabolism and peptidase activity in Alzheimer's Disease. Post-mortem human tissues were used.

\$195,000. N.I.H. - P01-CA 27502. 1981-1997. Chemoprevention of Skin Cancer Program Project Grant. Thomas P. Davis, Co-investigator. David Alberts, M.D. P.I. of grant (Cancer Center) To Study Pharmacology of Micronutrients as Chemopreventive Agents in Man and Animals.

\$720,800. N.I.H. 2-R-01-MH 42600-10. 1989-1998. Thomas P. Davis, P.I. Effect of Neuroleptic Drugs on Neurotensin and β -endorphin. This grant was designed to study the effect of centrally acting drugs on the processing, metabolism and levels of specific neuropeptides in discrete brain regions.

\$300,000. N.I.H. P-01-HD26013. 1991-1999. Thomas P. Davis, Co. Investigator of Section. This grant is to study the metabolism and distribution of milk-borne, biologically active, growth promoting, proteins and peptides in suckling rats.

\$150,000. ADCRC #9706. 1996-1999. Thomas P. Davis, P.I. Regulation of Neutral Endopeptidase in Small Cell Lung Cancer. Role in Smokers. Arizona Disease Control Research Commission.

\$18,388. N.I.H. #97T226189. 1999. Thomas P. Davis, P.I. "Conference on Management of Biomedical Research Laboratories." Tucson, Arizona. October 1-3, 1998.

\$99,000. N.I.H. F32-NS10580. 1997-2000. Thomas P. Davis, Sponsor. NRSA Post-doctoral Fellowship. Awarded to Dr. Thomas Abbruscato to study hypoxia induced injury in a *in vitro* endothelial cell model of the blood brain barrier.

\$140,000. N.I.H. R01-DA04248. 1993-2001. Victor Hruby, P.I., Thomas P. Davis, co-investigator. Opioid Receptor Specific Peptides and the Blood Brain Barrier - Effect of Structure. In this grant I study the stability of specific peptides in blood and brain tissue and their passage across the BBB using an *in vitro* method.

\$150,000. ADCRC #1341. 1998-2001. Thomas P. Davis, P.I. Nicotine effects on blood-brain barrier integrity, function and permeability. Arizona Disease Control Research Commission.

\$829,000. N.I.D.A. 1-P01-DA06284. 1982-2002. Thomas P. Davis, P.I. of Section. Victor Hruby, P.I. of grant (Chemistry). Opioid Peptide Drug Analysis, Distribution and Metabolism. This grant is designed to study newly developed opioid peptide drugs in both *in vitro* and *in vivo* models in an effort to design a novel opioid peptide drug for treating drug dependent individuals.

\$345,000. ADCRC #1-543. 2000-2003. Thomas P. Davis, P.I. of Section 1. Stroke and the Blood-Brain Barrier, Nicotine and Nicotinic Acetylcholine Receptors. Arizona Disease Control Research Commission. In this grant/contract , I study the role nicotine plays on BBB integrity and endothelial cell cytoarchitecture.

\$129,000. N.I.H. F32-NS11175. 2000-2003. Thomas P. Davis, Sponsor, NRSA fellowship to Karen S. Mark, Ph.D. to study "Hypoxia reoxygenation effects on the blood-brain barrier."

\$172,000. N.I.H. F32-DA06037. 2000-2003. Thomas P. Davis, Sponsor, NRSA fellowship to Jason D. Huber, Ph.D. to study “Various pain states on opioid transport across the BBB.”

\$84,000. N.I.H. F32-NS43052. 2001-2004. Thomas P. Davis, Sponsor. NRSA fellowship to Rachel C. Brown, Ph.D. to study “Molecular biology of calcium effects on tight junctions of the blood-brain barrier.”

\$129,000. N.I.H. F32-NS43046. 2002-2005. Thomas P. Davis, Sponsor. NRSA fellowship to Ken A. Witt, Ph.D. to study “ Blood-brain barrier changes via hypoxia/re-oxygenation.”

\$135,000. N.I.H. F32-NS49894 . 2004-2006. Thomas P. Davis, Sponsor. NRSA fellowship to Melissa Fleegal, Ph.D., to study the “Effects of angiotensin II and hypoxia on the blood brain barrier.”

\$98,224. N.I.H. F32-NS52983. 2005-2007. Thomas P. Davis, Sponsor. NRSA fellowship to Tracy Brooks, Ph.D., to study the "Modulation of BBB TJ proteins with chronic inflammation."

\$102,000. N.I.H. F31-DA19744. 2006-2009. Thomas P. Davis, Sponsor. NRSA Pre-doctoral fellowship to Melissa Seelbach, B.Sc., to study "Effects of peripheral inflammation on opioid transport".

\$182,661. N.I.H. R01 CA 09820-02S1. 2005-2007. Research Supplement to Promote Reentry into Biomedical Research.. Thomas P. Davis, P.I. of project entitled: Role of HIF-1 and Thioredoxin in Regulating Serotonin Transporter Gene. This Research Supplement to Promote Reentry into Biomedical Research was made to Gwen McCaffrey, Ph.D., to continue her studies on the effects of hypoxia on serotonin transporter expression in brain vascular endothelial cells.

\$20,000. N.I.H. R13- NS62445. 2008. Thomas P. Davis, P.I. Conference grant for Gordon Research Conference, “Barriers of the CNS”, held at Tilton School, Tilton, NH, June17-21, 2008.

\$176,564. N.I.H. DA11271- 06SI. 2004-2009. Thomas P. Davis, Sponsor. Research Supplement for Underrepresented Minorities, Pre-doctoral fellowship awarded to Christopher C. Campos, to study, “Mechanisms Associated with Alterations in the Blood Brain Barrier during Peripheral Inflammatory Pain States” for his Ph.D. program.

\$3,518,000. N.I.H. R01-NS39592-06-10. 2000-2010. Thomas P. Davis, P.I. Disruption of the blood brain barrier during hypoxia/reoxygenation. This grant was designed to study the permeability of the BBB after ischemic/hypoxic stress and the specific PKC enzyme mechanisms associated with maintaining tight junction protein structure during hypoxia/reoxygenation insult, *in vivo*.

\$114,000. N.I.H. NS42652-06SI. 2008-2011. Thomas P. Davis, Sponsor. Research Supplement for Underrepresented Minorities, Pre-Doctoral fellowship awarded to Lucy Sanchez-Covarubias, B.S. to study, “Effect of peripheral pain on the function and trafficking of Pgp at the Blood Brain Barrier”.

\$3,421,103. N.I.H. 5 R01-DA11271-17. 1998-2017. Thomas P. Davis, P.I. **Blood to CNS Drug Uptake in Pain states.** In this grant we studied pain and opioid versus non-opioid drug effects on claudin-5 and occludin tight junction protein “leak” at the BBB. We also observed *in vivo*, drug-drug interaction (DDI) mechanisms associated with paracellular leak at BBB tight junctions during acute and chronic (L4/L5) pain. Our most recent work now implicates the “over the counter” pain therapeutic acetaminophen (APAP) , in DDI and drug-transporter trafficking and claudin-5 leak of opioids, co-administered. This is a valid concern since Tylenol 2,3,4 contain APAP plus codeine in the formulary and many pain patients abuse Tylenol each day.

\$3,487,500. N.I.H. 5 R01-NS42652-12-17. 2001-2019. Thomas P. Davis, P.I. **Blood Brain Barrier Changes Induced by Pain.** This grant was designed to study the molecular signaling mechanisms associated with P- glycoprotein (Pgp) trafficking at the BBB, as effected by chronic morphine and acute versus chronic pain. Our results reported Pgp-associated and neighboring proteins signal Pgp activation via p CAV1 for Pgp trafficking. These increases in Pgp activity were shown to take place via phosphorylation of caveolin 1. This regulates the trafficking from the endothelial nucleus to the lumen, where Pgp limits analgesic drug delivery. Our recent findings suggest Pgp trafficking events in morphine tolerant animals contributes to opioid drug escalation and ultimately to challenges of opioid pain management.

Submitted and Awaiting Review : \$3,054,000. N.I.H. R01-DA 051812-01. 2020 - 2025. Increased CNS Opioid exposure by a Acetaminophen - Induced Blood Brain Barrier Mechanism. Thomas P. Davis (40 % FTE effort) and Patrick Ronaldson M.P.I’s. This application will be reviewed by the BINP standing study section on February 10, 2020. The prior A1 application received a 17 % priority score in March of 2019 from a BINP SEP, but was not funded.

2. Active :

N.I.H. ROI-NS72830-A1. 2017-2022. Tally Largent-Milnes, P.I., **Thomas P. Davis, Co-Investigator at 15% FTE effort. Blood Brain Barrier and Migraine: Effect on Therapy.** This grant studies the role the blood brain barrier plays in regulating sumatriptan therapy during each phase of migraine headache in male versus female rats. Our hypothesis is that the BBB/NVU alters therapeutic drug delivery and efflux during each phase of a migraine headache. Recently we have shown that cortical spreading depression induced by a single KCl injection increases paracellular BBB uptake of small molecules at discrete times during headache induction. Using a combinatorial approach of electrophysiology, behavioral measures, and *in situ* brain perfusion, we found cortical KCl injection temporally increased paracellular BBB leak in the cortex, but not brainstem. We also observed an increase in BBB permeability to sumatriptan in both cortex as well as brainstem, indicating the potential for changes in transporter activity.

N.I.H. ROI- NS 084941-06 A1. 2020- 2025. Patrick Ronaldson, P.I. **Thomas P. Davis, Co-Investigator at 25% FTE effort. Targeting Blood-Brain Barrier Transporters to Treat Ischemic Stroke.** This competitive renewal application focuses on beneficial effects of endogenous blood-brain barrier (BBB) transporters in therapy of ischemic stroke in a rat model of the transient middle cerebral artery occlusion. We propose that neuroprotective effectiveness of statins results from efficient transport across BBB that is mediated by the uptake transporter OATP 1a4. A1 application, scored at 14 % , is now funded, award effective 3/1/2020, by NINDS.

<http://www.ncbi.nlm.nih.gov/sites/myncbi/thomas.davis.1/bibliography/40850852/public/?sort=date&direction=ascending>. H Factor (google scholar) of 65 with 15000 citations.

B. INDUSTRY/FOUNDATIONS

1. Inactive (Completed Total Direct Costs \$960,000):

\$19,000. Lederle Labs, Nutley, New Jersey. 1981-1983. Pharmacokinetics of Mitoxantrane and Bisantrone in cancer patients-New Antineoplastic Agents. Thomas P. Davis and David L. Alberts.

\$13,000. Pharmaceutical Manufacturers Association Foundation Grant, Washington, D.C. 1982-1984. Thomas P. Davis, P.I. Study the neuropharmacology and pharmacokinetics of neuropeptides in the gastrointestinal system and brain through the processing of novel peptides.

\$23,900. Robert S. Flinn Foundation for Medical Research, Phoenix, Arizona. 1985-1986. Effect of centrally acting drugs on β -endorphin processing in the brain. Thomas P. Davis, P.I. This grant is designed to study the effects of specific drugs such as haloperidol and chlorpromazine on peptide metabolism at the synaptic membranes.

\$6,500. 1985-1986. Syntex Research, Inc., Palo Alto, California. Double Blind Evaluation of the Effect of Captopril When Added to Nicardipine Hydrochloride in Patients with Hypertension.

Thomas P. Davis and Tim Fagan, MD, P.I.'s.

\$125,000. 1983-1987. Hansen Natural, Inc., Los Angeles, California. Isolation, purification and biological characterization of neuropeptides from biological materials. Thomas P. Davis, P.I. Study the activity of specific natural proteins and peptides in central and peripheral bioassay models after ion exchange isolation.

\$34,000. 1984-1989. Akzo Pharmaceutical Inc. Organon Scientific Development Group, Oss, The Netherlands. Effect of peripheral drug therapy on central β -endorphin processing. Thomas P. Davis, P.I. Study the effect of drug therapy on specific central neuropeptide processing in animals.

\$65,000. 1994-1998. Neurex Corporation, Menlo Park, California. Contract for omega conotoxin/ziconotide / SNX 111, peptide drug delivery research. Thomas P. Davis, P.I.

\$5,000. 1995. Gift from **Parke-Davis/Warner Lambert** for contributions in the field of peptide drug delivery to the CNS.

\$30,000. 1995-1998. Parke-Davis Pharmaceutical Research, Ann Arbor, MI. Contract in Peptide drug research. Thomas P. Davis, P.I.

\$640,000. 1990-2011. IPSEN Neuropharmaceutical Inc., Biomeasure Neuropharmacology Laboratory, Milford, MA. Thomas P. Davis, P.I. Radiolabeling and purification of novel/proprietary peptide drugs for radioligand binding and pre-clinical biodistribution studies.

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