

## CURRICULUM VITA

### **Mark M. Rasenick, Ph.D.**

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University of Illinois at Chicago College of Medicine  
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#### Education:

<u>Postdoctoral Fellow</u>	1977 to 1981, Yale University School of Medicine, Department of Pathology: Molecular and Cellular Basics of Neurotransmitter Action with Mark W. Bitensky, M.D.
<u>Doctor of Philosophy</u>	1977, Wesleyan University, Middletown, CT
Major:	Developmental Biology (Invertebrate Neuroendocrinology and Neuropharmacology)
Thesis:	3'5' Cyclic AMP and the Transduction of Photoperiodic Signals by the Insect Brain
Advisor:	Spencer J. Berry, Ph.D.
<u>Bachelor of Arts</u>	1971, Case Western Reserve University, Cleveland, Ohio
Majors:	Biology/Political Science

#### Academic Teaching and Research Experience:

9/06-	Distinguished UIC professor
9/03-	Director, UIC Interdisciplinary Neuroscience Program
9/99-10/00	Robert Wood Johnson Health Policy Fellow: Senate Committee on Health Education, Labor and Pensions; Senator Edward M. Kennedy (D. Mass.)
6/98-	Director, Biomedical Neuroscience Training Program, University of Illinois at Chicago College of Medicine
6/95-	Professor, Dept. of Psychiatry, University of Illinois at Chicago College of Medicine
9/93-	Professor, Dept. of Physiology and Biophysics, University of Illinois at Chicago, College of Medicine
9/90-9/96	Director of Graduate Studies — Dept. of Physiology and Biophysics
7/88-8/93	Associate Professor (with tenure) — Dept. of Physiology and Biophysics, University of Illinois at Chicago College of Medicine

#### Academic Teaching and Research Experience: (continued)

- 7/83-7/88 Assistant Professor — Dept. of Physiology and Biophysics, University of Illinois at Chicago College of Medicine
- 7/83-6/86 Member, Mental Health Clinical Research Center — Illinois State Psychiatric Institute
- 7/83-6/85 Neuropharmacology Research Affiliate — Dept. of Neurology, Yale Medical School
- 5/82-6/83 Associate Research Scientist — Dept. of Neurology, Yale Medical School
- 1/82-4/82 Research Associate — Dept. of Pathology, Yale Medical School

Other Work Experience:

- 8/71-9/72 Program Director, U.S. National Student Association, Washington, DC

Awards and Honors:

- Student Body President, Case Western Reserve University, 1970-1971
- Sigma Xi Grant in Aid of Research, 1976
- Wesleyan University Special Graduate Research Fellowship, 1976-1977
- Yale Membrane Center Fellow, 1977-1979
- NIH-NIAMDD Individual National Research Service Award, 1979-1981
- Chicago Community Trust Fellow (Outstanding Young Faculty Award), 1984-1986
- Research Scientist Development Award Level II - NIMH, 1987-1992
- Research Scientist Award NIMH, 1992-1997
- University of Illinois Scholar, 1989-1992
- Mark Dworkin Memorial Lecturer, Wesleyan University, 1995
- Phillip Hawley Distinguished Faculty Award for Excellence in Graduate Education, 1995, 2004
- 1998 Distinguished Faculty Award, University of Illinois College of Medicine
- Robert Wood Johnson Health/Science Policy Fellow, National Academy of Science, USA, 1999-2000

Scientific Service:

- Member, Molecular and Cellular Neurobiology Panel, National Science Foundation, 1/89-1/92
- Member, NIH Special Study Sections (various), 1984-present; Pharmacology (Ad hoc) 1994-present; Molecular, Cellular, Developmental Neuroscience (Ad hoc) 1995-1998
- Molecular, Developmental and Cellular Neuroscience V (Ad hoc), 1998-present
- Member, NIMH Special Study Sections (Neuroscience Training) 2002- (Chair 2004)
- Member, US Military Research Command Breast Cancer Review Panel, Molecular Biology, 1997; Pathobiology, 1998-present
- Member, Review Panel American Heart Association of Metropolitan Chicago/Illinois Affiliates, 1993
- Reviewer (Ad hoc) NSF Sensory Physiology and Perception Panel, 1985
- Reviewer of Grant Proposals for AFOSR, 1984-; Veterans Administration 1985-; MRC Canada 1994
- Editorial Boards: Neuropsychopharmacology, 2002-2006, Current Psychiatry Reviews, 2005-2008; Biochemica et Biophysica Acta, Molecular and Cellular Physiology 2005- 2008, Psychopharmacology, 2006-2010 Translational Research, 2006-
- Reviewer for Am. J. Physiol., Biochemica et Biophysica Acta, Biochemical Pharmacology, Biochemistry, Biological Psychiatry, Brain Research, Experimental Cell Research, FASEB

Journal, Journal of Biological Chemistry, Journal of Neurochemistry, Journal of Cellular Biochemistry, Journal of Cell Science, Journal of Neuroscience, Journal of Pharmacology and Experimental Therapeutics, Molecular Pharmacology, Proceedings of the National Academy of Sciences, Science, Trends in Cell Biology, and Trends in Neuroscience, 1983-current

Society for Neuroscience: Chapters and Communications Committee, 1997-2000

Government and Public Affairs Committee 2001-2004 (vice-chair, 2003-)

International Affairs Committee (2002-2005)

Chicago Chapter: Councilor 1992-1994; President 1997-1998

Steering Committee, Chicago Signal Transduction Symposium, 1987-current

Interamerican Consortium on Basic and Clinical Neuroscience (founder)

International Brain Research Organization: North American Regional Committee, Committee on Coordination of Basic and Clinical Neuroscience

American College of Neuropsychopharmacology: Liason Committee with Government and Industry

Professional Societies:

American Association for the Advancement of Science, Member

American Society for Biological Chemistry and Molecular Biology, Member

American Society for Cell Biology, Member

American College of Neuropsychopharmacology, Member

Sigma Xi, Member

Society for Neuroscience, Member

Union of Concerned Scientists, Member

Research Support—current and previous three years (Principal Investigator unless indicated):

NIH 5RO1 MH 39595-17-22; Cytoskeletal Regulation of Neuronal G Protein Signaling, 12/1/84-11/31/07.

NIH MH 39595 Diversity Supplement 6/6/05-12/31/06

NIH R21 DA020568 Structural basis for reciprocal regulation of the GTPases tubulin and G $\alpha$  09/30/2005 - 07/31/2007

NIH T32 MH067631 Training in the Neuroscience of Mental Health 06/01/04-05/31/09

NIH T32 HL 076922-11-15; Training in Cellular Signaling in the Cardiovascular System; 07/01/00-06/30/10; Trainer; R. John Solaro, PI

NIH T32 DK 07739-01-05; Training in Signal Transduction and Cellular Endocrinology; 07/01/02-06/30/07; Trainer; P. Gettins, PI

NIH K01 DA00505-02: Dynorphin Modulates CGRP Release via PKC 11/01/01-10/31/06  
Mentor for Z. Wang

Pfizer Basic Research Grant: G Protein Coupling and the Mechanism of Ziprasidone Action 01/01/05-12/31/06

ILEX Oncology/Genzyme: Phospholipid signaling and microtubule disrupting drugs 6/1/04-12/31/05

NIH 5 RO1 MH 57391; G Protein Coupling in Antidepressant Drug Action, 07/01/99-06/30/03.

NIH 5 RO1 AG 15482; Regulation of G Protein Mediated Phospholipid Signaling by Tau; 09/01/97-06/30/03.

Research Support: (previous)

Rush University; G Proteins Signaling in Alzheimer's Disease; 06/01/98-05/31/00.

Pfizer; Molecular and Cellular Biology of Antidepressant Therapy: 12/25/99-12/24/00.

Council for Tobacco Research 4089; Tubulin: Mediator of Crosstalk in Signal Transduction; 07/01/95-06/30/99.

Lilly Research Labs; G-Protein Distribution in Human Leukocytes; 11/15/98-11/14/99.

Eli Lilly; Coupling Between Gs and Adenylyl Cyclase in Human Leukocyte Membranes; 12/01/98-11/30/99.

Council for Tobacco Research; Cytoskeletal Components as Regulators of Second Messenger Interactions; 07/01/97-12/31/98.

NIMH Research Scientist Award; KO2 MH 00699-05-10; Regulation of Neuronal Signal Transduction; 08/31/92-09/01/97.

Abbott Laboratories Neuroscience Venture, "Molecular Basis of Antidepressant Action," 07/01/93-06/30/96.

Theodore and Vada Stanley Foundation, "Molecular Basis of Antidepressant Action," 08/01/94-07/31/96.

NIAMDD National Research Service Award, "Regulation of Adenylate Cyclase by Fluoride," AMO6287, 1979-1981.

AFOSR Research Grant, Environmental Toxicology, 83-0249, 06/01/82-08/15/86.

BRSR Research Award — Regulation of Neuronal Adenylate Cyclase 10/83-10/84. Regulation of Signal Transduction in Cultured Neural Cells, 12/01/86-11/30/87.

Eli Lilly Basic Research Grant — 1984-1986.

NIMH Research Grant RO1 MH 39595; Cytoskeletal Interaction with Neuronal Adenylate Cyclase, 12/1/84-11/31/95.

Chicago Community Trust; Outstanding Young Scientist Award, 1984-1986.

Research Scientist Development Award Level II; MH 00699; Regulation of Neuronal Signal Transduction, 09/01/87-08/31/97.

NSF Research Grant, Signal Transduction in Cultured Neural Cells, 04/01/88-08/31/93.

Sterling-Winthrop Research Institute, "Adenylate Cyclase Regulation in Human Platelets," 01/01/89-12/03/90.

American Heart Association. "Mapping Receptor Interaction Sites on G proteins," 7/1/89-6/30/92 (with H. Hamm).

University of Illinois Scholar Fund, 10/01/89-09/30/92.

T32 HL 076922; Training in Cellular Signaling in the Cardiovascular System; 07/01/90- 06/30/95; Trainer; R. John Solaro, PI.

Abbott Laboratories Neuroscience Venture "Molecular Basis of Antidepressant Action," 10/15/93-10/14/94.

Other scientific support:

Janssen Corporation; Basic and Clinical Neuroscience Issues: A Dialogue with Latin America;  
06/25/99-10/27/99.

MacArthur Foundation; Basic and Clinical Neuroscience Issues: A Dialogue with Latin America;  
10/19/99-10/23/99.

Solvay Corporation; Basic and Clinical Neuroscience Issues: A Dialogue with Latin America;  
08/01/99-10/23/99.

Wyeth-Ayerst; Basic and Clinical Neuroscience Issues: A Dialogue with Latin America; 08/01/99-  
10/23/99.

Robert Wood Johnson Foundation; Robert Wood Johnson Health Policy Fellowship (9/1/00-8/31/01)

NIMH : Interamerican Consortium on Basic and Clinical Neuroscience (Meeting support)  
11/1/2001-3/1/02

Abbott Laboratories, Unrestricted Educational Grant 12/1/03-11/30/04

Bristol Meyers Squibb. Unrestricted Educational Grant 11/1/03-10/31/04

Glaxo Smith Kline. Unrestricted Educational Grant 1/1/04-12/31/04

Forrest Laboratories. Unrestricted Educational Grant 11/1/03-10/31/04

Janssen Research Foundation. Unrestricted Educational Grant 4/1/04-3/31/05

Novartis Inc. Unrestricted Educational Grant 12/1/03-11/31/04

Solvay Inc. Unrestricted Educational Grant 10/1/03-9/30/04

Somerset Corp. Unrestricted Educational Grant 12/1/03-11/31/04

Wyeth-Ayerst Co. Unrestricted Educational Grant 11/1/03-10/31/04

Teaching Activities:

8/77-8/77 (Wesleyan) Teaching Assistant: Neurophysiology, General Biology, Cell Biology and Genetics.

Teaching Associate and Lab Director, Mammalian Physiology

Lecturer in Reproductive Biology, Developmental Biology, Mammalian Physiology and Endocrinology.

8/77-7/83 (Yale) Advisor, Undergraduate Research Projects (3 students); Medical Student Research Project (1 student); M.D./Ph.D. project (Jointly with M. Bitensky; 1 student)

8/83-8/90 University of Illinois College of Medicine, Physiology (Dental) Neurophysiology, Sensory Physiology Pathophysiology (Pharmacy) Respiratory and Pulmonary Physiology: Autonomic Physiology and Pharmacology, Cellular Neurophysiology.

8/83-present Medical Physiology: Autonomic Physiology, Cellular Neurophysiology, Circulatory and Metabolic Features of the Brain, Neurobiology of Synaptic Function and Integration of Synaptic Events, Physiology of Spinal Reflexes, Neurologic Basis of Chemical Sensation, Neurobiology of Language and Emotion, Neurobiology of Aging.

Ph.D. Thesis Committee Member: UIC (various departments), 51 students (Chair, 14); Northwestern University 3 students, Loyola University Stritch School of Medicine 2 students, Rush University 1 student.

Graduate Physiology, Pharmacology and Biochemistry: Cellular Physiology (Second Messenger Systems and their Regulation; Molecular Biology of the Cytoskeleton). Endocrinology, Behavioral Physiology, Tactics and Strategy in Modern Physiology, Techniques in Cellular Physiology (Separation of Cellular Components), Techniques in Neuroscience (Cultured Cells as Model Neural Systems) Molecular Biology of the Cell, Receptor Physiology and Pharmacology (Course Director)

Neuroscience for Neurology and Psychiatry Residents: (Neurochemistry and Molecular Neurobiology)

National Center for Advanced Medical Education (National Review Course for Medical Board Exams in Neurology and Psychiatry) Basic Neurochemistry: Biology, Biochemistry and Pharmacology of Neurons and Glia

Guest Faculty, Loyola University, Stritch School of Medicine: Receptor Pharmacology Course — 1990-present

- 1) Molecular and Cellular Basis of G Protein Function
- 2) Cyclic AMP- A Historical Perspective

Faculty Emory University

- 1) Future Leaders in Psychiatry
- 2) Psychiatry Residents Symposium

Ph.D. Thesis Advisor:

<u>Name</u>	<u>Ph.D. Awarded</u>	<u>Current Position</u>
Nan Wang, Ph.D.	1990	Assoc. Res. Scientist., Columbia University, P. & S.
Kun Yan, M.D.,Ph.D.	1991	Asst. Prof., Physical and Rehabilitation Medicine, UIC
Li Zeng, M.D., Ph.D.	1994	Instructor Pathology, UC Davis
Jiang Chen, Ph.D.	1995	Staff Scientist, Lucent Technologies, Naperville, Illinois
Kimberly ChaneyMD/PhD	2002	Resident in Radiology, UIC
NingFang Chen	1996 (M.S)	Research Specialist, Searle (Pfizer) Skokie, IL
JiEun Oh	2005	Post Doc Mount Sinai School of Medicine-Neuroscience
John Allen		Ph.D. Student, UIC
Witchuda Saenswang		Ph.D. Student, UIC
Rahul Dave		M.D./Ph.D. Student UIC

Awards won by students:

Nan Wang	3rd Place Sigma Xi Research Forum
Kun Yan	Sigma Xi Research Grant; 2nd Place, UIC Student Medical Research Forum
Li Zeng	2nd Place UIC Student Medical Research Forum; 1st Place, Midwest Student Medical Research Forum; Am. Soc. Cell Biol. Travel Award
Jiang Chen	Honorable Mention, Student Medical Research Forum; Am. Soc. Cell Biol. Travel Award
JiEunOh	Scholarship—Marine Biological Laboratory Physiology Course, Woods Hole, MA

Postdoctoral Mentor

<u>Name</u>	<u>Current Position</u>
Shinichi Hatta, Ph.D.	Professor and Head, Pharmacology, Takasaki Med. Coll.
Hiroki Ozawa, M.D./Ph.D.	Professor and Head, Psychiatry Nagasaki Medical College
Masayuki Watanabe, M.D.	Asst. Professor, Sapporo Medical College
Milenko Lazarevic, M.D./Ph.D.	Asst. Professor, Loyola Stritch College of Medicine
Sukla Roychowdhury, Ph.D.	Research Assistant Professor, Univ. Texas, El Paso
Juliana S. Popova, Ph.D.	Research Assistant Professor, UIC
Marie E. Knight, Ph.D.	Staff Scientist, IGEN Corp.
Sadamu Toki, M.D./Ph.D.	Asst. Professor, Sapporo Medical College
Jaclyn Holda, Ph.D.	Post-Doctoral Fellow, Univ. N. Carolina, Chapel Hill
Jiang-Zhou Yu, M.D./Ph.D.	Res. Asst. Prof., UIC, Physiology and Biophysics
Robert Donati, Ph.D.	Assistant Prof. Ill. College of Optometry Chicago
Tulika Sarma, Ph.D.	Post-Doctoral Fellow, UIC, Anatomy and Cell Biology
Robyn Halvorsen, Ph.D.	PostDoctoral Fellow, UIC Physiology and Biophysics

Medical Student Research Advisor:

<u>Name</u>	<u>Current Position</u>
Panos Kokoropoulos, M.D.*	Medical Practice, Chicago
James Geraghty, M.D.*	Assistant Professor, Otolaryngology, UIC
Theodore Wynnechenko, M.D.*	Anesthesiology Practice, Lutheran General Hospital, Niles IL
Edward Krowiak, M.D.	Otolaryngology practice, Washington, DC
Andrew Ringer, M.D.*	Asst. Prof, Neurosurgery, Univ. Cincinnati

Sheila Dugan, M.D.	Asst. Prof Rehabilitation Medicine Rush U.
Susan Tong, M.D.	OB/GYN practice, Denver, Colorado
Robert Dickstein, M.D.*	Radiology practice—Chicago IL
Loretta Chou, M.D.*	OB/GYN, practice
Andrea Bial, M.D.*	Instructor in Medicine (Gerontology) U. Chicago
Carlos Ortega, M.D.*	Metro Group, Surgery Practice UIC
Erik Messamore, Ph.D., M.D.	Asst. Prof, Psychiatry, Oregon Health Sciences Univ.
Erin Greene, M.D.*	Postdoctoral Research Fellow Boston Children's Hospital
Howard Willson M.D.*	Emergency Medicine, MetroHealth Hospital, Cleveland, OH
Gaurav Chaturvedi M.D.*	Fellow in Medicine (Gastroenterology), UIC
Joshua Medow M.D.*	Resident in Neurosurgery, Univ. of Wisconsin
Matthew LoConte M.D.*	Resident in Medicine, Oregon Health Sciences Univ.
Asif Dhar*	M4 UIC (on leave)
Chandrashekhara Thukral PhD, M.D.	Resident in Medicine, Beth Israel/Deaconess Hospital, Boston
Brian Layden, Ph.D. M.D.	Resident in Medicine, Northwestern U.
Angela Taylor*	M3 UIC
Kathya Valdez	M2 UIC

\* These students have won C.M. Craig Summer Research Fellowship Awards

#### Other Awards won by Medical Students:

Andrew Ringer	1st Place, UIC, Student Medical Research Forum 2nd Place, National Student Medical Research Forum
Andrea Bial	2nd Place, UIC, Student Medical Research Forum
Sheila Dugan	Dooley Award — Outstanding UIC Student
Erik Messamore	2nd Place, UIC, Student Medical Research Forum James Scholar Independent Study Award
Erin Greene	3rd Place, UIC, Student Medical Research Forum James Scholar Independent Study Award Howard Hughes Medical Institute Research Award
C. Thukral	James Scholar Independent Study Award.
Brian Layden	James Scholar Independent Study Award, 2nd Place, UIC, Student Medical Research Forum
Angela Taylor	3rd Place, UIC, Student Medical Research Forum
Kathya Valdez	NIH Minority Supplement

#### Administrative Responsibilities (major committee assignments):

Neuroscience Training Program Committee (Chair), 1998-  
 Director of Graduate Studies, Department of Physiology and Biophysics, 1990-1996  
 College of Medicine Executive Committee, 1990-present  
 Departmental Advisory Committee, 1989-present  
 Graduate College Executive Committee 2002-2004  
 Task Force Member, Liaison Committee on Medical Education, 1986  
 Animal Welfare Committee, Small Animal Subcommittee, 1989-1991  
 Student Advancement Committee, M1 Subcommittee, 1990-1992; 1994-present  
 Executive Board Member, UIC Interdisciplinary Neuroscience Program, 1988-  
 Executive Board Member, Chicago Signal Transduction Program, 1988-present  
 Department Head Review: OB/GYN – Chair, 1995-1996; Biochemistry and Molecular Biology,

1998; Genetics – Chair, 1999-2000  
UIC Colloquium on Signal Transduction (Chair), 1989-present  
Search Committee – Director of the Center for Neuroscience (Chair), 1995-1996;  
Search Committee – Scientific Director for the Illinois State Psychiatric Institute (Co-Chair),  
1994-1995  
Search Committee – Head, Department of Anatomy and Cell Biology, 2000-2001  
UIC-UIUC Neuroscience Task Force (Chair), 1995-1997  
UIC Senate, 1994-present  
University Committee on Promotion and Tenure, 2001-2004  
UIC Integrated Neuroscience Program Co-Head (2003-)

Community Activities:

North Shore Congregation Israel Social Action Committee, Chair, 1994-1999  
Shalom Project, Board of Directors, 1990-1995  
Committee to Revamp Science Curriculum (District 37 Elementary Schools), 1990-1992  
Coach – Jr. Football, Wilmette Park District, 1992  
Mentor, Senior Project: New Trier High School, 1995

Other Activities:

Commission on Social Action of Reform Judaism (National Board Member), 1998-2004  
Served as Fellow on the Public Health Subcommittee staff of Senator Edward M. Kennedy (D. MA)  
Expert witness: Physiological ramification of neuropsychiatric drugs  
Interviews on WBEZ (public radio) concerning “physiology of fear” and AP, Reuters and The  
Guardian (UK) concerning biomedical research in Cuba.  
Organizer of pending biomedical postdoctoral exchange program between Cuba and the U.S.  
Founder “Interamerican Consortium on Basic and Clinical Neuroscience”  
Invited Testimony U.S. Senate Committee on Foreign Relations, 2002

Invited Symposia:

- 7/81 Membrane fluidity, microtubules and the G unit of adenylate cyclase. Catecholamine  
Gordon Conference. Tilton, NH
- 7/83 Effect of hydrazines upon synaptic membrane adenylate cyclase. AFOSR Life Sciences  
Conference, Irvine, CA.
- 3/84 Tubulin and adenylate cyclase: Stimulation and inhibition of adenylate cyclase. Dual  
Regulation of Adenylate Cyclase Conference, Steamboat Springs, CO.
- 4/84 G proteins and antidepressant action. Illinois State Psychiatric Institute
- 9/84 Cytoskeletal regulation of neurotransmitter action. Chicago Medical School  
(Biochemistry and Structure)
- 12/84 Regulation of neuronal adenylate cyclase by microtubule proteins. NY Academy of  
Sciences Dynamic Aspects of Microtubule Biology, New York City, NY
- 1/85 Cytoskeletal modulation of hormone action. Michael Reese Medical Center  
(Endocrinology)

- 2/85 Cytoskeletal modulation of hormone action. University of Illinois at Chicago, (Biochemistry)
- 3/85 G Protein and antidepressant action. Indiana University School of Medicine, Indianapolis (Psychiatry Grand Rounds)
- 4/85 The cytoskeleton and neurotransmitter receptor response. Nova Pharmaceutical Company, Baltimore
- 4/85 Tubulin as a G protein? University of Chicago, (Pharmacology and Physiology)
- 9/85 GTP-binding protein interact with microtubule proteins to modulate adenylate cyclase. 2nd International Conference on Microtubules, Antwerp, Belgium.
- 10/85 Cytoskeletal regulation of neurotransmitter action. Los Alamos National Labs (Life Sciences Division)
- 11/85 The cytoskeleton and neurotransmitter receptor response. DuPont Experimental Station, Wilmington, DE
- 2/86 Regulation of neuronal adenylate cyclase . Conference on the Molecular Mechanisms of Neuronal Responsiveness. Burlington, VT.
- 3/86 Cytoskeletal regulation of neurotransmitter action. University of Florida Medical School, Gainesville (Pharmacology)
- 4/86 Neuronal Signal Transduction (organizer and chairman) – Chicago area Neuroscience Meeting, Chicago, IL
- 5/86 The cytoskeleton as a modifier of hormone action. University of Texas Medical School –Houston (Physiology and Cell Biology)
- 5/86 Guanine nucleotide exchange among GTP-binding proteins. G-proteins and Signal Transduction, Cold Spring Harbor.
- 7/86 Nucleotide exchange among synaptic-membrane GTP-binding proteins. FASEB Conference on Receptors; Saxtons River, Vermont.
- 9/86 Adenylate cyclase coupling in permeabilized C6 glioma cells. VI International Conference on Cyclic Nucleotides, Calcium and Protein Phosphorylation. Bethesda, MD
- 3/87 G proteins as mediators of hormone action. Bristol Meyers Lecture in Undergraduate Pharmacology. University of California, Santa Barbara (Biology)
- 4/87 Chicago Neuroscience Conference Symposium on Receptor-Effector Coupling in the Nervous System

- 4/87 Cytoskeletal regulation of hormone action. Indiana University School of Medicine (Medicine Grand Rounds)
- 5/87 Anatomy Physiology Workshop National Conference for Community and 4 year college teachers. Invited lecture on "Recent advances in understanding the cytoskeleton," River Grove, IL
- 6/87 A monoclonal antibody against  $G_{\alpha}$  blocks G protein-mediated adenylate cyclase stimulation and inhibition. Gordon Conference on Second Messengers and Protein Phosphorylation. Meriden, NH.
- 9/87 The cytoskeletal as a modifier of hormone action. Wesleyan University, Middletown, CT (Biology)
- 10/87 Cytoskeleton regulation of hormone action. Northwestern University Medical School (Pharmacology)
- 1/88 Tubulin modifies G protein actions. ICI Americas - Stuart Pharmaceuticals – Wilmington, DE
- 3/88 Cytoskeletal elements modify neuronal signal transduction. University of Illinois at Chicago, Dept. of Pathology
- 3/88 Cytoskeletal elements modify neuronal signal transduction. University of Illinois at Urbana, Physiology and Biophysics
- 5/88 Guanine nucleotide exchange and the regulation of neurotransmitter responsiveness. NIMH Conference on Molecular Neurobiology. Santa Barbara, CA.
- 8/88 Cytoskeletal modification of signal transduction: Tubulin as a G protein? EMBO-NATO Advanced Research Workshop on the Guanine Nucleotide Binding Proteins; Common Structural and Functional Properties. Renesse, Netherlands.
- 10/88 Molecular basis of antidepressant action. Sterling Winthrop Research Institute, Rensselaer, NY
- 2/89 Photoaffinity analogs of nucleotides: uses and pitfalls. Satellite Symposium of the ASBMB-ASCB Meeting, San Francisco, CA
- 4/89 Tubulin as a G protein? Department of Biochemistry, University of Vermont, Medical School, Burlington, VT
- 5/89 Cytoskeletal elements modify neurotransmitter action. Department of Biology, Illinois Institute of Technology, Chicago, IL
- 5/89 Tubulin as a G protein? Department of Pharmacology, Case Western Reserve University School of Medicine Pharmacology Cleveland Ohio
- 5/89 Tubulin-G protein interactions and the regulation of signal transduction in cultured glioma cells. Symposium on Signal Transduction. Washington, DC.

- 6/89 Tubulin-G protein complex formation. Gordon Research Conference. Meriden, NH.
- 10/89 Interacting second messenger systems in the central nervous system. Hokkaido Neuroscience Society (Keynote Address). Sapporo, Japan
- 10/89 Specific association between tubulin and G proteins. VII International Conference on Second Messengers and Protein Phosphorylation. Kobe, Japan
- 11/89 Cytoskeletal regulation of receptor-effector coupling. Weis Research Institute,  
Geisinger Clinic, Danville, PA.
- 02/90 Cytoskeletal Control of neuronal Signal Transduction. UIC Signal Transduction Colloquium, Chicago, IL.
- 04/90 Cytoskeletal regulation of receptor effector coupling in the CNS. Dept. of Pharmacology, Loyola University, Stritch School of Medicine, Maywood, IL.
- 05/90 Tubulin-G protein interactions: cytoskeletal regulation of neuronal signal transduction. Depts. of Biochemistry and Pharmacology, Cornell University, Ithaca, NY.
- 05/90 Tubulin-G protein interactions: cytoskeletal regulation of neuronal signal transduction. Dept. of Pharmacology, SUNY Upstate Medical Center, Syracuse, NY.
- 10/90 Regulation of neuronal signal transduction by cytoskeletal elements. Dept. of Physiology, University of Connecticut Health Sciences Center, Farmington, CT.
- 10/90 Regulation of neuronal signal transduction by cytoskeletal elements. Dept. of Biology, Wesleyan University, Middletown, CT.
- 10/90 Regulation of neuronal signal transduction by cytoskeletal elements. Dept. of Ophthalmology and Visual Science, Yale University School of Medicine, New Haven, CT.
- 11/90 Regulation of neuronal signal transduction by cytoskeletal elements. Dept. of Pharmacology, University of Michigan Medical School, Ann Arbor, MI.
- 12/90 Regulation of neuronal signal transduction by cytoskeletal elements. Dept. of Cellular, Molecular and Structural Biology, Northwestern University Medical School.
- 01/91 Receptor effector coupling: regulation by cytoskeletal elements. Dept. of Medicine, Gastroenterology Section, University of Illinois College of Medicine.

- 04/91 Tubulin-G protein interactions modify neurotransmitter response and responsiveness. Dept. of Pharmacology, Loyola University, Stritch School of Medicine, Maywood, IL.
- 04/91 Molecular Basis of Antidepressant Action. Dept. of Psychiatry (Grant Rounds), University of Chicago, Chicago, IL.
- 05/91 Tubulin-G protein interactions modify neurotransmitter response and responsiveness. Dept. of Physiology and Biophysics, The Chicago Medical School, North Chicago, IL
- 09/91 Tubulin-G protein complexes may regulate neurotransmitter responsiveness, VII International Symposium on Cellular Endocrinology: G Protein in Cellular Physiology, Lake Placid, NY
- 10/91 The cytoskeleton and signal transduction. Depts. of Biology and Chemistry, Northern Illinois University, DeKalb, IL
- 10/91 G Proteins and Antidepressant Action, Bristol Meyers Symposium on the Biology of Affective Disorder, New Haven, CT
- 02/92 Cytoskeletal elements modify hormone and neurotransmitter action. Dept. of Pharmacology, SUNY Stonybrook, Stonybrook, NY
- 08/92 Tubulin-G protein interactions modify signal transduction. VII International Conference on Second Messengers and Phosphoproteins, Glasgow, Scotland.
- 08/92 Molecular interface of tubulin-G protein complexes, UIC Molecular Biology Retreat, Lake Geneva, WI
- 09/92 Neurotransmitter signal transduction and its modification by cytoskeletal elements. 2<sup>nd</sup> NIMH Conference on Molecular Neurobiology, Keystone, CO
- 09/92 The molecular basis of antidepressant action. Neurosciences in the 21st Century (NPI 50th Anniversary), UIC, Chicago, IL
- 11/92 Receptor G protein coupling, Cardiovascular Research Forum, Rush Medical School, Chicago, IL
- 01/93 Cytoskeletal modification of neuronal signal transduction, Rush Medical School, Dept. of Cell Biology, Chicago, IL
- 05/93 Chronic drug treatment and neuronal signal transduction, Loyola Univ., Maywood, IL
- 06/93 Receptor G protein coupling in permeable cells, Univ. of Chicago, Gastroenterology
- 06/93 Activation of G proteins by cytoskeletal elements, Gordon Research Conference, Meriden, NH
- 06/93 Molecular basis of antidepressant action. Abbott Laboratories, Neuroscience Group.

- 01/94 Department of Pharmacology and Physiology, University of Chicago (Cytoskeleton-signal transduction)
- 01/94 Department of Ophthalmology, UIC (Peptides as probes to inhibit receptor-G protein coupling)
- 03/94 Hokkaido Neuroscience Society, Sapporo Japan (Molecular basis of antidepressant action)
- 03/94 Japanese Pharmacology Society, Kyoto (Cytoskeleton-signal transduction) presidential lecture
- 03/94 Mitsubishi Kasei Research Center, Yokohama, Japan (Synthetic peptides and antidepressant action)
- 04/94 Wesleyan University, Biology and Molecular Biophysics Departments (Cytoskeleton-signal transduction) Mark Dworkin Memorial Lecture
- 04/94 Yale Univ. Medical School, Dept. of Surgery and GI Research Center (Cytoskeleton-signal transduction)
- 04/94 UIC Pathology, (Cytoskeleton-signal transduction)
- 05/94 Rush Univ. Pharmacology (Cytoskeleton-signal transduction)
- 06/94 CINP XIX Meeting Washington, D.C., Molecular basis of antidepressant action.
- 07/94 XII International Congress of Pharmacology, Montreal, Regulation of G protein signaling by elements of the cytoskeleton (also chaired symposium)
- 09/94 International Union of Biochemistry Delhi, India Symposium on Regulation of Biological Polymers. "Tubulin-G protein complexes."
- 09/94 Department of Physiology Texas A&M University. "Cytoskeletal regulation of G protein mediated signal transduction."
- 10/94 Medical Scientist Training Program. University of Illinois at Chicago. "Cytoskeletal regulation of G protein mediated signal transduction."
- 01/95 Department of Biochemistry, Loyola Univ. Stritch School of Medicine. "Cytoskeletal regulation of G protein mediated signal transduction."
- 02/95 Department of Physiology and the Integrated Committee on Cell Biology. University of Illinois at Urbana-Champaign. "Cytoskeletal regulation of G protein mediated signal Transduction."
- 04/95 Department of Biochemistry and Molecular Biology, University of Massachusetts, Amherst. "Cytoskeletal regulation of G protein mediated signal transduction."

- 04/95 Integrated Neuroscience Program, University of Massachusetts Medical School, Worcester. "Cytoskeletal regulation of G protein mediated signal transduction."
- 04/95 Department of Biochemistry, University of Kansas, Lawrence. "Cytoskeletal regulation of G protein mediated signal transduction."
- 06/95 Gordon Research Conference and Biological Structure and Gene Expression. "Tubulin regulation of G protein function." Newport, RI
- 08/95 Conference on the cytoskeleton and neuronal degeneration, Robinson College, Oxford, UK. "Synaptic tubulin and microtubule associated proteins regulate neurotransmitter responsiveness."
- 09/95 2nd International Conference on Affective Disorder, Jerusalem, Israel. "G proteins and therapeutics for affective disorders."
- 10/95 9th International Conference on 2nd Messengers and Phosphoproteins, Nashville, TN. Symposium on "Signal Transduction and the Cytoskeleton," Chair.
- 01/96 "Regulation of G protein signaling by cytoskeletal components," Wyeth-Ayerst Research Laboratories, Princeton, NJ
- 02/96 "G protein signaling and antidepressant action," Gastroenterology Research Forum, UIC.
- 03/96 "Biological models for understanding newer antidepressant and anti-bipolar drugs," Symposium on Time Course of Improvement in Acute Mania: Rationale for Drug Selection, Dallas, TX
- 04/96 Biochemistry of Alzheimer's Disease: Receptor-G protein coupling, Neurology Grand Rounds, UIC
- 05/96 Molecular basis of antidepressant action. Univ. California - Santa Barbara
- 06/96 The cytoskeleton and signal transduction. International Society for Heart Research, Chicago, IL
- 08/96 Model systems for the study of antidepressant action. World Congress of Neuropsychiatry, Seville, Spain
- 09/96 Dept. of Pharmacology, St. Louis Univ., G-protein mediated signal transduction and its regulation by cytoskeletal components.
- 10/96 Dept. of Pharmacology, Medical College of Wisconsin, Milwaukee. Regulation of neuronal signal transduction by cytoskeletal proteins.
- 10/96 Dept. of Pharmacology, Univ. Wisconsin, Madison. Regulation of G protein signaling by components of the cytoskeleton.

- 11/96 Vollum Institute-Oregon Health Sciences University, Portland Oregon. G proteins and the cytoskeleton.
- 12/96 Cuban Neuroscience Center and Centro Internacional de Restorauracion Neurologica, Havana, Cuba. Molecular basis of antidepressant action.
- 03/97 Winter conference on Neural Plasticity, St. Lucia. G proteins and synaptic shape.
- 03/97 Northwestern University, Department of Pharmacology, Chicago, IL. G protein signaling and the cytoskeleton.
- 06/97 4th World Congress of Biological Psychiatry, Nice, France. G proteins and antidepressant action.
- 06/97 Inserum U-99 Creteil (Paris), France. Form and Function in Signal Transduction.
- 06/97 Gordon Research Conference on Second Messengers and Protein Phosphorylation, Meriden New Hampshire. G proteins and microtubule polymerization.
- 08/97 In. Union of Biochem. & Mol. Biol. (IUBMB) San Francisco: Photoaffinity labeling as a tool to study G protein signaling.
- 09/97 Lilly Research Laboratories, Indianapolis, IN: G proteins and antidepressant action: Studies in a model system.
- 01/98 Loyola University, Dept of Physiology, Maywood, IL. Form and Function in Signal Transduction: G proteins and the cytoskeleton.
- 02/98 UIC signal transduction colloquium: Form and Function in Signal Transduction: G proteins and the cytoskeleton.
- 02/98 Children's Memorial Research and Education Foundation, Chicago. Form and Function in Signal Transduction: G proteins and the cytoskeleton.
- 03/98 Yale U. School of Medicine, Pharmacology. New Haven, CT. Form and Function in Signal Transduction: G proteins and the cytoskeleton.
- 03/98 Cuban Neuroscience Center, Havana. Form and Function in Signal Transduction: G proteins and the cytoskeleton.
- 03/98 Hermanos Ameijeiras Hospital, Havana. Psychiatry Grand Rounds. Molecular Basis of Antidepressant Action: a role for G proteins.

- 06/98 Cong. Int. Neuropsychopharmacology Glasgow, UK. Symposium on New Research. Chronic antidepressants reorder G protein signaling components in the plasma membrane.
- 06/98 "Form and Function in Signal Transduction: G proteins and the cytoskeleton." Dept. of Pharmacology, Univ. Glasgow, UK.
- 07/98 Mobility within the membrane by the G protein, Gs, is increased after chronic antidepressant treatment. Collegium Intl. Neuropsychopharmacol. Glasgow, UK
- 07/98 G protein signaling and the cytoskeleton. Dept. Pharmacology, U. Glasgow, Glasgow, UK
- 10/98 Regulation of G protein signaling by cytoskeletal components. Dept. of Pharmacology, Univ. Pennsylvania, Philadelphia, PA
- 10/98 Regulation of G protein signaling by cytoskeletal components. Rheumatology Research Seminar, UIC
- 10/98 Psicohabana '98 (Latin American Psychiatric Congress) Molecular Mechanisms of Antidepressant Action. Havana, Cuba (Plenary Lecture)
- 11/98 Regulation of G protein signaling by cytoskeletal components. Nephrology Research Seminar, Univ. of Chicago.
- 01/99 Form and function in G protein signaling. Dept. of Physiology, Loyola University, Maywood, IL
- 01/99 G protein signaling and the cytoskeleton, UIC M.D./Ph.D. Forum, Chicago, IL
- 02/99 G protein signaling in the nervous system. Intensive Neuroscience Review Course, UIC
- 02/99 Form and function in signal transduction. Dept. of Biology, Wesleyan University, Middletown, CT
- 02/99 Gordon Conference on Molecular Pharmacology. Invited discussion leader, Ventura, CA
- 03/99 G proteins and antidepressant action. "New Directions in Therapy for Depression and Anxiety." Zeneca Pharmaceuticals, Orlando, FL
- 04/99 Molecular basis of antidepressant action. Dept. of Biology—Molecular Pharmacology Program, Univ. of CA, Santa Barbara
- 06/99 G protein signaling and the cytoskeleton. Cuban Neuroscience Center/Center for Biotechnology of Cuba, Havana Cuba

- 06/99 Form and function in signal transduction. Medical College of PA/Hahneman Univ., Philadelphia, PA
- 10/20/99 G protein signaling in the nervous system. U.S./Cuba Neuroscience Symposium, Havana, Cuba. (Principal U.S. organizer)
- 02/18/00 Cuban Neuroscience: Possibilities for Exchange and Mutual Collaboration. AAAS Annual Meeting, Washington DC
- 10/7/00 Signal transduction in the nervous system and its regulation by components of the cytoskeleton. The cytoskeleton and the birth, life and death of the nervous system. Pucon, Chile.
- 10/30/00 G protein signaling and the cytoskeleton: Form and function in signal transduction. National Institute of Diabetes, Digestive and Kidney Disease, NIH, Bethesda, MD
- 1/30/01 G protein signaling and the cytoskeleton: Form and function in signal transduction. Department of Pharmacology, University of Texas Health Sciences Center, San Antonio, TX
- 3/01 G protein signaling and the cytoskeleton at the post-synaptic density. Neuroscience Seminar Series, University of Illinois at Urbana Champaign, Urbana, IL
- 4/01 Form and Function in Signal Transduction: Microtubules form the interface between the cytoskeleton and G protein signaling. French-American Colloquium on the cytoskeleton and human disease. Marseilles France
- 5/01 Signaling in the cell and in the Senate. Graduation Address, MD/PhD program UIC
- 5/01 G protein signaling and the cytoskeleton: Form and function in signal transduction. Dept. of Physiology and Biophysics, UIC
- 5/01 G protein signaling and the cytoskeleton: Form and function in signal transduction. Dept. of Surgical Oncology, UIC
- 6/01 G protein signaling and the cytoskeleton: Form and function in signal transduction. Faculty of Science, Mahidol U. Bangkok, Thailand
- 6/01 G protein signaling and the cytoskeleton: Form and function in signal transduction. Hanoi Medical University, Hanoi, Vietnam.
- 7/01 Confocal imaging reveals that the G protein, G $\alpha$  undergoes cellular redistribution subsequent to chronic antidepressant treatment. 6<sup>th</sup> World Congress of Biological Psychiatry. Berlin, Germany.
- 8/01 Form and function in signal transduction: the interface between G proteins and the cytoskeleton as a target for antidepressant therapy. Janssen Research Center, Beerse, Belgium

- 9/01 G protein signaling and the cytoskeleton: Form and function in signal transduction. Cellular Signaling Program , Depts. Of Biology and Chemistry. Northern Illinois University DeKalb, IL)
- 11/01 Implications of recent advances in Genetics and Neurobiology for the Clinical Practice of Psychiatry. Basic and Clinical Neurosciences, a Dialog with Latin America. Santo Domingo, Dominican Republic.
- 3/02 G protein signaling and the cytoskeleton: Form and function in signal transduction. Department of Pharmacology, Loyola University Medical School, Maywood, IL
- 3/02 G protein signaling and the cytoskeleton: Relevance for Neuronal Plasticity. Wyeth-Ayerst Pharmaceuticals—Neuroscience Division, Princeton, NJ
- 4/02 G protein signaling and the cytoskeleton: Form and function in signal transduction. Neurobiology Seminar Series Meharry Medical College, Nashville, TN
- 4/02 Molecular Basis of Antidepressant Action. “Future Leaders in Psychiatry” Miami Beach, FL
- 5/02 Depression and Antidepressants: Using the tools of molecular and cellular biology to determine chart a new course. Pharmacology and Biotechnology Seminar Series, U. California Santa Barbara, Santa Barbara, CA
- 5/02 G protein signaling and the cytoskeleton: Form and function in signal transduction. Physiology Seminar Series. U Mass Med. Ctr. Worcester, MA
- 6/02 Cuban Advances in Biomedical Sciences: U.S. Senate Committee on Foreign Relations Washington DC (invited testimony)
- 6/02 G protein signaling and the cytoskeleton: Form and function in signal transduction. Pharmacology Seminar Series. U Colorado Health Sciences Center Denver, CO
- 8/02 Synaptic plasticity and psychotherapeutic agents. Advances in the Diagnosis, Biology and Treatment of the Major Psychiatric Disorders. Palm Beach, FL
- 09/02 Synaptic Plasticity and Antidepressant Action. International Neuropsychiatric Association Buenos Aires, Argentina
- 10/02 Tubulin-G protein complexes: Implications for cytoskeletal dynamics and cellular signaling. The Protein Society of India—Inaugural Meeting Bombay (Mumbai), India
- 11/02 Modeling the G protein-tubulin interface as a therapeutic target. Institute for Biotechnology and Genetic Engineering. Havana , Cuba
- 11/02 Synaptic plasticity and antidepressant action. Cuban Neuroscience Society. Havana Cuba
- 12/02 Visualization of G proteins in neurons and glia: agents that influence synaptic sprouting

cause a realignment of G $\alpha$  and cytoskeletal components. American College of Neuropsychopharmacology San Juan, Puerto Rico

- 1/03 How the Budget Process Works and How Neuroscience can get it's share. Winter Conference on Brain Research, Snowbird Utah
  
- 3/03 Form and Function in signal transduction: G protein signaling and the neuronal cytoskeleton. Frontiers in Neuroscience—Emory U. Atlanta GA
  
- 3/03 Form and Function in signal transduction: G protein signaling and the cytoskeleton. Laboratory of Molecular Biology—UIC
  
- 4/03 Advocacy for Neuroscience—How to talk to Congress. Oregon Chapter - Society for Neuroscience- Salishan OR
  
- 5/03 Synaptic Plasticity, Depression and the mechanism of Antidepressant action. Future Leaders in Psychiatry—Palm Beach, FL
  
- 6/03 Signal Transduction in the living Neuron. Hanoi Medical University—Hanoi, Vietnam
  
- 6/03 Imaging in Neuroscience—From molecules to the mind. Hanoi Vietnam
  
- 7/03 Form and Function in Signal Transduction, G proteins and the cytoskeleton. Dept. of Pharmacology, Medical University of South Carolina
  
- 9/03 Form and Function in Signal Transduction, G proteins and the cytoskeleton. Dept. of Biochemistry, Case Western Reserve U. Cleveland, Ohio
  
- 1/04 Synaptic Plasticity and antidepressant action. US/Cuba meeting on Biological Psychiatry. Havana, Cuba
  
- 1/04 Synaptic Plasticity and antidepressant action. US/Cuba meeting on Biological Psychiatry. Havana, Cuba
  
- 2/04 Molecular modeling and antidepressant action. World Federation of Societies of Biological Psychiatry. Sydney, Australia
  
- 4/04 Synaptic Plasticity, Depression and the mechanism of Antidepressant action. Future Leaders in Psychiatry—Palm Beach, FL
  
- 4/04 G proteins and the cytoskeleton, Department of Biology, U. Texas El Paso
  
- 5/04 G protein signaling and the neuronal cytoskeleton: Form and function in signal transduction. Jr. Faculty Award Lecture, Karolinska Institute, Stockholm, Sweden

- 5/04 G proteins and the cytoskeleton, Division of Basic Science, U. South Dakota School of Medicine. Vermillion, S. Dakota
- 6/04 Membrane microdomains and antidepressant action. Collegium International Neuropsychopharmacology Paris France
- 6/04 G protein signaling and the cytoskeleton: Form and function in signal transduction. INSERM Fer a Moulin Paris France
- 9/04 G protein signaling, the cytoskeleton and a synaptic model for mood disorders. Interamerican meeting on the neuroscience of Brain Disorders, Vina del Mar, Chile
- 10/04 G protein signaling and synaptic remodeling. NIDA Workshop on synaptic plasticity and neural repair. Bethesda MD.
- 12/04 Membrane microdomains and antidepressant action ACNP annual meeting, San Juan
- 1/05 Cellular and Molecular Biology of Mood and Anxiety: Student Medical Research Forum UIC (keynote)
- 3/05 The synaptic biology of depression: Cellular signaling and the search for novel therapies: U. California Santa Barbara- Undergraduate Pharmacology Program
- 4/05 Synaptic biology of Mood Disorders. "Future Leaders in Psychiatry" Palm Beach, FL.
- 5/05 Independent trafficking of Beta2 receptors and Gsalpha through lipid raft domains. Gordon Research Conference on Molecular Pharmacology Il Ciocco, Italy
- 9/05 "Heterotrimeric G proteins, Lipid Rafts and the Cytoskeleton: Form and Function in Signal Transduction" Dept. of Pharmacology, U. North Carolina, Chapel Hill NC
- 11/05 "Heterotrimeric G proteins, Lipid Rafts and the Cytoskeleton: Form and Function in Signal Transduction" Dept. of Physiology, Mahidol U. Bangkok Thailand
- 11/05 "Recent advances in Neuroscience: Therapeutic implications for diseases of the brain and mind" 1<sup>st</sup> Praskop Ratanakorn Lecture, Bangkok Thailand
- 11/05 "Lipid rafts and G protein Trafficking" in a symposium titled "It's the Pits: Lipid Rafts and Neurotransmitter Signaling" Society for Neuroscience, Washington DC (Symposium Chair)
- 11/05 "Lipid rafts. Neurotransmitter signaling and the action of antidepressant drugs" "Symposium on Molecular and Cellular approaches to Brain Disease" Vina del Mar, Chile (symposium co-organizer)
- 12/05 "Agonist-induced lipid trafficking and subsequent internalization of Gs alpha regulates cAMP signaling" in symposium "Lipid Rafts, Caveolin-related proteins and Neuronal Signaling" Am. Col. Neuropsychopharmacology Meeting Waikoloa, Hawaii
- 12/05 "G protein trafficking and its relevance to depression and antidepressant therapy" in

- symposium “Protein Trafficking and therapeutic mechanisms for mood disorders”. Am. Col. Neuropsychopharmacology Meeting Waikoloa, Hawaii
- 1/06 “G protein trafficking and cytoskeletal dynamics” Dept. of Pharmacology, Miami U., Miami FL
- 3/06 “Lipid rafts. G protein signaling and the antidepressant action” Symposium on Molecules and Mood Disorders, CINP Asia-Pacific meeting, Pattaya, Thailand
- 3/06 “G protein trafficking, the cytoskeleton and neurotransmitter responsiveness” Nagasaki Neuroscience Meeting, Nagasaki, Japan
- 4/06 “Molecular Mechanisms of Depression and Antidepressant Action” U. N. Carolina, Chapel Hill Grand Rounds—Psychiatry
- 5/06 “Regulation of G protein signaling by membrane and cytoskeletal components” U. Alabama Birmingham Dept of Physiology
- 10/06 “Protein Trafficking at Synapses and Therapeutic Agents for Mood Disorders” Society for Neuroscience Symposium Atlanta Co-Chair
- 10/06 “G protein signaling and the cytoskeleton” Plenary Lecture Brazilian Pharmacology Society Ribeirao Preto, Brazil
- 10/06 “ G protein Signaling as a Therapeutic Locus for Mood Disorders” U. Sao Paulo, Brazil
- 10/06 “Teaching Advocacy to Medical and Graduate students” AAMC Seattle WA

Patents:

Use of Green Fluorescent Protein (GFP) in the Study of Cellular Signaling and G Protein Dynamics. Mark Rasenick and Jiang-Zhou Yu. Filed 6 July 2001

A Marker for Antidepressant Therapy and Methods Related Thereto. US Patent # 6,875,566 Mark Rasenick, Robert Donati and Sadamu Toki Awarded 5 April, 2005; US patent 7,118,858 Awarded 10/10/06

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- 1977 RASENICK, M.M. 3'5' Cyclic AMP and the Transduction of Photoperiodic Signals by the Insect Brain (Ph.D. Thesis, Wesleyan University).
- 1978 RASENICK, M.M., Neuberger, M. and Berry, S.J. Cyclic nucleotide activation of silkworm brain: cellular localization and further observations on the pattern of activation. J. Insect Physiology, 24:137-139.
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- 1980 RASENICK, M.M. and Bitensky, M.W. Partial purification and characterization of a macromolecule which enhances fluoride activation of adenylate cyclase. Proc. Natl. Acad. USA, 77:4628-4632.
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Note: This document is meant as a narrative supplement to the curriculum vitae and will serve to explain administrative activities, consultantships and other items relevant to administration. A research summary is also included.

## **CAREER RESPONSIBILITIES**

1983-2005

University of Illinois Chicago, College of Medicine

7/83-8/88     Assistant Professor, Dept. of Physiology & Biophysics,  
9/88-8/93     Associate Professor, Dept. of Physiology & Biophysics,  
9/93-           Professor - Dept. of Physiology & Biophysics  
6/95-           Professor - Dept. of Psychiatry,  
6/98-           Director, Biomedical Neuroscience Training Program,  
8/01 -           Director, Interdisciplinary Training Program in Neuroscience

Dr. Rasenick's responsibilities have been, primarily, to conduct research on G protein signaling and the cytoskeleton and to probe the relationship of this to neurodegenerative disorders, mood disorders and the normal function of the human brain. He has been continually funded by the National Institute of Mental Health since his arrival at UIC and has also been funded by the National Institute on Aging, the Air Force Office of Scientific Research and various corporate and philanthropic sources. His research group currently contains three postdoctoral fellows (two have the rank of research assistant professor), three graduate students (PhD and MD/PhD), two medical students and two rotation students. A summary of his research interests appears below (page 38).

Dr Rasenick is also actively involved in teaching to graduate and professional students where he delivers a number of lectures on the autonomic nervous system, cellular neurophysiology and the physiology and pharmacology of receptors. He has twice received the Phillip Hawley award for his graduate teaching and has been nominated for the Golden Apple award for his teaching to medical students. Dr. Rasenick also lectures on neuropsychopharmacology to Residents in Neurology and Psychiatry and has taught in a national Neurology Board Review Course as well as in national symposia for psychiatry residents and junior faculty (Future Leaders in Psychiatry).

Dr. Rasenick has been invited to numerous national and international forums to present his research and these are listed in the CV. Dr. Rasenick has also lectured widely on health policy –especially concerning the Neuroscience of Mental Health. He is the Principal Investigator of an NIMH Training Grant designed to foster translational research by bringing UIC psychiatry residents into basic science laboratories for two years. It is noteworthy that 36% of those residents are underrepresented minorities and this training program has a goal of increasing the number of minorities involved in research in academic psychiatry.

The program that has been developed in Neuroscience has extended beyond the Department of Psychiatry. UIC lacked the ability to grant a PhD in neuroscience and Dr. Rasenick partnered with a colleague in the Biology Department to form an interdisciplinary program in neuroscience. This program was awarded funds from the Graduate College and was recently granted approval from the Illinois Board of Higher

Education to award the PhD degree. One hundred eleven faculty from colleges of Allied Health, Arts & Sciences, Dentistry, Engineering, Medicine, Nursing and Pharmacy have joined together in this effort. Dr. Rasenick is currently managing this program along with Dr. Simon Alford.

Dr. Rasenick has also performed service related to research. He has served on the small animal subcommittee for the IACUC and has chaired two inquiries into academic fraud. He has also served on or chaired several five year review committees for academic department heads in the college of medicine and has served on several search committees for new department heads. He has served as a member of the Faculty Senate as well as the of the Advisory Committee of the Department of Physiology & Biophysics and Executive Committees the College of Medicine and the Graduate College these are all elected positions and the Advisory and Executive Committees serve to oversee the Department Head and College Deans. He has also served on the Provost's Committee on Promotion and Tenure, a committee that decides P&T for the entire University. Finally, he has chaired and served on number of Graduate Student Qualifying Exam and Thesis committees in many departments at UIC as well as at Loyola and Northwestern.

Dr. Rasenick has also been involved in service for research on a national and international level. He has served on several NIH regular and special study sections (Initial Review Groups) as well as on panels reviewing grant proposals for NSF and the US Army Breast Cancer Initiative. He has also reviewed Grant Proposals for the Wellcome Trust (a major research funder in the UK) and the American Cancer Society and the Alzheimer's Association. In addition to this, he has served as a reviewer for a large number of journals and is currently on the Editorial Boards of Neuropsychopharmacology (a NATURE journal), Biochemistry et Biophysica Acta (Section editor—Molecular and Cellular Physiology), Current Psychiatry Reviews and Psychopharmacology.

Dr. Rasenick's service to Research also includes advocacy. He has made numerous trips to Washington to promote neuroscience to legislators. He was co-chair of the Government and Public Affairs committee of the Society for Neuroscience. In this capacity, he worked with neuroscientists from throughout the US on bettering their communication skills and has presented many seminars on "How Congress Works and how Scientists can Better Communicate with them". This is part of an effort by the society for neuroscience to partner with disease advocacy groups to increase awareness of Brain Research and the importance of doing this.

In the 1999-2000 academic year, Dr. Rasenick was named a Robert Wood Johnson Health Policy Fellow. He served on Senate Committee on Health Education, Labor and Pensions and in doing so, functioned as a member to the staff of Senator Edward M. Kennedy (D. Mass). His responsibilities during that year included working on a medicare-drug bill (formally sponsored by Sen. Daschle) and a bill to mandate insurance coverage for colon cancer screening. The primary sponsors of this bill were Senators Kennedy and Helms. Both of these bills had been written, or substantially written before Dr. Rasenick's arrival and he was involved in arranging a hearing for the former bill and promoting the later. In that capacity Dr. Rasenick worked with several cancer advocacy groups as well as with Katie Couric and the colon cancer group she had developed.

From a policy standpoint, however, the most intensive aspects of the work Dr. Rasenick did involved Mental Health and organ transplant. For the later, Senators Kennedy and Frist were able to work together to develop legislation designed to implement broader sharing of cadaveric organs and the implementation of a national transplant policy and Dr.

Rasenick's efforts on this bill involved both research, negotiation and drafting legislation. Organ transplant policy in the US had been developed by a private government contractor and was (as, alas, still is) inadequate from an egalitarian and utilitarian standpoint to meet the needs of those on organ waiting lists. The other major issue that Dr. Rasenick worked on was mental health. One aspect of this work was to support the efforts of Senators Domenici and Wellstone to implement parity for mental health coverage. He worked closely with staff from Senators Wellstone and Jeffords to organize a hearing on this issue. The other mental health project was to write a new bill (along with Senator Domenici) designed to implement the recommendations of the Surgeon General's report on Mental Health (delivered in November 1999). Of the issues that Dr. Rasenick worked on, this was the only one that became public law (106-310). Parts of this bill were incorporated into the Children's Health Act of 2000 and Dr. Rasenick was involved in the House-Senate Conference that adopted this legislation.

In addition to administering the Neuroscience Program and the Biomedical Neuroscience Training program, Dr. Rasenick was selected by the UIC provost to serve as a Committee on Institutional Cooperation (the academic arm of the Big Ten) Academic Leadership Program Fellow. Fellows in the program hone administrative and leadership skills and learn about a number of policy issues facing higher education.

#### CONSULTING:

Dr. Rasenick has served as a consultant on psychiatric and anti-cancer drugs and their actions to the following companies:

Abbott Laboratories, North Chicago, IL  
Astra-Zeneca, Wilmington DE  
DuPont Pharmaceuticals, Wilmington DE  
Eli Lilly, Indianapolis Indiana  
Genzyme (ILEX oncology) San Antonio, TX  
Janssen Pharmaceutica, Beerse Belgium  
Nutrition 21, Purchase NY  
Pfizer Inc.—Groton CT.  
Wyeth-Ayerst, Princeton, NJ

These involve speaking with companies about specific details of pipeline compounds as well as discussions of long-range planning for drug development. Curiously, both scientists and marketing executives are usually involved in these discussions. Dr. Rasenick has also had a number of long-term collaborations with various company scientists. He has served as an expert witness in cases involving psychiatric medications.

#### COMMUNITY SERVICE

Dr. Rasenick has been active in international research infrastructure improvements, He is a member of the International Affairs Committee of the Society for Neuroscience/National Academy of the Sciences and in this capacity he organized a delegation to Hanoi to work with faculty at Hanoi Medical University to develop infrastructure for neuroscience research. He has also founded the Interamerican Consortium on Basic and Clinical Neuroscience which is intended to foster cooperation in neuroscience between Latin America and the US. This has resulted in four meetings thus far (two in Havana, one in Santo Domingo , Dominican Republic, one in Buenos Aires and two in Vina del Mar, Chile). This work has allowed the creation of an atmosphere of cooperation and several of the participants have begun individual collaborations, Support for this has been received from the MacArthur Foundation as well as from various Drug Companies. A recent meeting on Biological Psychiatry in Havana (January 2004) received support from the UN Development Program as well. Note that several drug companies are interested in Cuba as a base for clinical trials and work has been done to facilitate this. In the course of these efforts, Dr. Rasenick has become expert on the Cuban Health system as well as on the biomedical products that they have developed. He was asked by Senator Dodd to testify in a hearing before the Senate Foreign Relations Committee concerning these matters.

Dr Rasenick has been active on the local level in efforts to modify the science curriculum for K-8 education. He has also volunteered to attend 7<sup>th</sup> and 8<sup>th</sup> grade classes in Chicago and suburbs in an effort to talk about the human brain and what it does.

Dr. Rasenick is a member of the Social Action committee of North Shore Congregation Israel in Glencoe Illinois, and has served as committee chair. He has organized drives to collect bicycles for Chicago children and has organized interfaith dialogs as well as speakers on a variety of topics centered around social justice. Dr. Rasenick has also served as a member of the Commission on Social Action of Reform Judaism. This group, which serves as the Board of Directors for the Religious Action Center in Washington, DC acts as an advocate for issues of social justice on behalf of the Union of Reform Judaism.

Finally, in his spare time, Dr. Rasenick cycles (even in the Chicago winter), sails, lifts weights and plays squash. He also writes light rhyme and has published a "poem" on G proteins.

## RESEARCH SUMMARY

The thrust of Mark Rasenick's research over the past 25 years has been the relationship between G protein signaling and the cytoskeleton and how this interaction might affect neurotransmitter response and responsiveness as well as synaptic plasticity.

In 1981, Rasenick and colleagues showed that the G protein responsible for activating adenylyl cyclase,  $G_s\alpha$ , was released from the synaptic membrane upon activation and that this protein appeared to have a link to the synaptic membrane through the cytoskeletal protein, tubulin. This suggested that the cytoskeleton participated in neurotransmitter signaling and led to a series of experiments over the next several years demonstrating that tubulin formed high-affinity complexes with certain heterotrimeric G proteins.

Curiously, it appeared that tubulin was capable of directly transferring GTP to  $G_s$ ,  $G_i$  or  $G_q\alpha$ . This provided a mechanism for a calcium-mediated activation of adenylyl cyclase in a G protein-dependent fashion, a phenomenon required in brain, as there is a surfeit of transmitter linked to inhibition of adenylyl cyclase over that coupled to activating the enzyme. This mechanism has been probed extensively. A series of mutational studies revealed a possible binding site for tubulin on  $G_s\alpha$  and most recently, proteomic studies and molecular modeling have revealed the molecular facets for this interaction. Small molecules are currently being designed to disrupt this interaction (see below).

In addition to adenylyl cyclase, Dr. Rasenick's group demonstrated how agents working through  $G_q$  to activate phospholipase c (such as acetylcholine) evoke rapid microtubule depolymerization. The tubulin dimers liberated by this process associate with membrane  $G_q\alpha$ . This potentiates phospholipase signaling (of significance to both brain and heart function) through the transactivation mechanism listed above. This also suggests that neurotransmitters might be involved in cytoskeletal remodeling.

This was demonstrated first, *in vitro*, when it was shown that purified  $G_s\alpha$  or  $G_i\alpha_1$  were capable of increasing the dynamic behavior of assembling microtubules by increasing the number of "catastrophies" (rapid disassembly) that they experience. It was shown that the mechanism for this was activation of the tubulin GTPase by  $G\alpha$ . The most recent modeling studies have now demonstrated the molecular rationale for this effect. Since the interaction between tubulin and  $G_s\alpha$  is now being studied using surface plasmon resonance (a biophysical technique that gives "high throughput" kinetic information of the interaction between these molecules and any agents designed to block that interaction), knowledge of the interface between these molecules is expanding rapidly. Furthermore, Rasenick's group is collaborating with a group at Northwestern experienced in crystallizing GTP-binding protein complexes on the generation and analysis of tubulin- $G_s\alpha$  crystals. This structural information will inform the studies described above and should dictate the design of small molecule probes designed to either mimic or disrupt the tubulin- $G_s\alpha$  interface.

Rasenick's group showed that when "dominant-negative" G proteins (disrupting the normal

interaction between tubulin and  $G\alpha$ ) were introduced into cells, the cells were prevented from sending out extensions (an event requiring dynamic microtubules). While initial studies were done with cultured cell lines, more recent studies showed that primary neurons expressing these mutant proteins failed to send out the extensions necessary to make synaptic connections. Thus, it seems that certain neurotransmitters, working through G proteins might orchestrate synaptic development.

Many of the data from these studies suggested that heterogeneity of membranes and cytoskeleton might serve to compartmentalize cellular signaling. In order to determine whether and how G proteins might move among cellular compartments, Rasenick's group developed a unique approach to imaging G proteins in living cells. Green Fluorescent Protein (GFP) allows one to follow movements of proteins labeled with that tag, but attaching it to either end (NH<sub>2</sub> or COOH) of a G protein blocks activity of that protein. Taking a cue from yeast, which has a large extra piece in the helical domain, a perfectly viable, fluorescent  $Gs\alpha$  protein (GFP- $Gs\alpha$ ) was developed, where GFP was incorporated into the internal sequence of  $Gs\alpha$ . This protein revealed that  $Gs\alpha$  was released from the membrane following activation and that it moved into lipid rafts prior to this internalization. These results suggested that the G protein separated from the receptor that activated it during the internalization process and followed  $Gs\alpha$  as it associated with and modified the microtubule cytoskeleton.

Finally, the lipid rafts alluded to above have become central to development of a unifying hypothesis for the cellular basis of antidepressant action. Rasenick and colleagues first saw (in 1983) that chronic treatment with a number of antidepressant compounds increased the activation of adenylyl cyclase by  $Gs\alpha$ . As these studies have been pursued in the intervening years, they developed a cultured cell model for examining the actions of these agents. It is now apparent that lipid rafts are crucial to this process (remember, these rafts represent a membrane domain where  $Gs\alpha$  signaling is diminished) and that chronic antidepressant treatment (chronic treatment is needed to achieve therapeutic effects of antidepressant drugs) moves  $Gs\alpha$  from lipid rafts into membrane domains where it enjoys a more facile association with adenylyl cyclase. Rasenick and colleagues recently verified this hypothesis by demonstrating that brain tissue from human suicides (with a diagnosis of depression) showed a higher proportion of  $Gs\alpha$  in lipid rafts than was seen in controls. This suggested that the ratio of lipid raft-associated (and cytoskeleton-associated)  $Gs\alpha$  might prove diagnostic for both depression and for determination of antidepressant efficacy. It also suggests that agents modifying the amount of  $Gs\alpha$  in lipid rafts (such as those which perturb the interface between  $Gs\alpha$  and tubulin—designed through crystallography and modeling studies described above) might make novel therapeutic agents for depression,