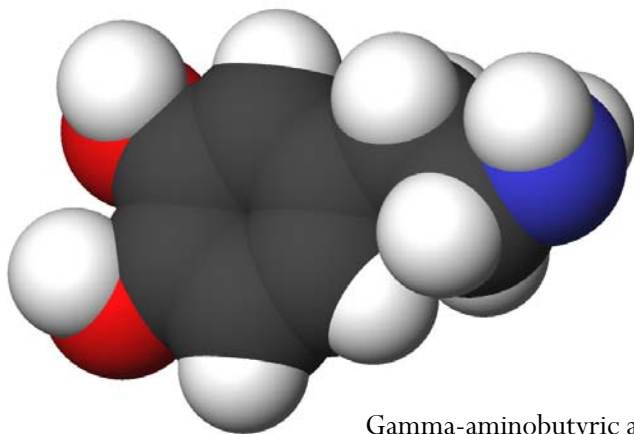


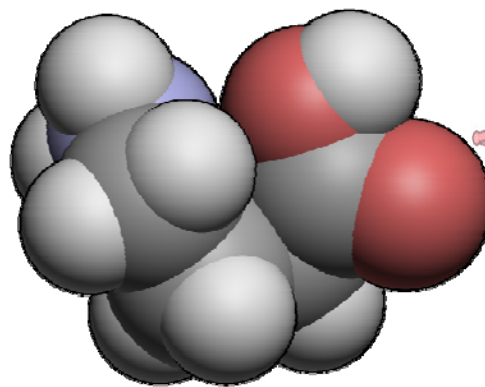
CELLULAR & MOLECULAR PHARMACOLOGY  
REPORT ON THE DEPARTMENT  
2007



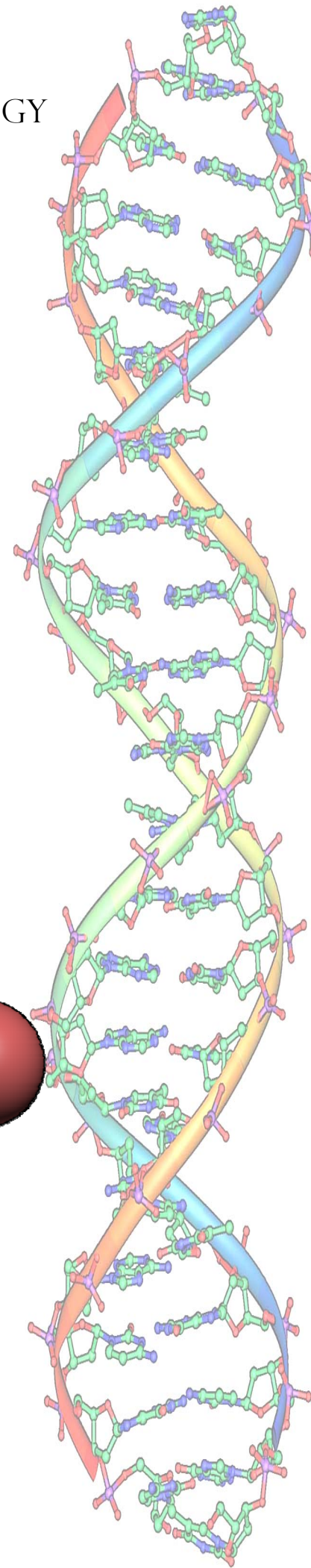
You cannot teach a man anything; you  
can only help him find it within himself.  
~Galileo Galilei



Gamma-aminobutyric acid (GABA)



Dopamine



## I. **2007 in summary**

In 2007, the department hummed with research and teaching activities. We started the year with one new faculty member, Dr. Kuei Tseng, and ended it with a second new faculty member, Dr. J. Amiel Rosenkranz joining us. We were sad to say goodbye to Dr. Xiu-ti Hu but pleased to know that he was moving to a tenure-track faculty position at Rush University Medical Center. Collaborations with Xiu-ti will certainly continue. This past year saw several faculty members active in local chapters of national organizations, such as the Society for Neuroscience (Dr. Micky Marinelli was elected secretary) and the American Society for Pharmacology and Experimental Therapeutics (ASPET; Drs. Hu and Ann Snyder each served a half year as Councilor for this organization). The department was also privileged to host the 20<sup>th</sup> annual scientific meeting of the Great Lakes Chapter of ASPET in May. Drs. Hu and Snyder put in countless hours planning the meeting and overseeing the day, which focused on the theme, "Neurobiology of Drug Addiction". The meeting featured Dr. Marina Wolf (Chair of the Department of Neuroscience at RFUMS) as keynote speaker and the afternoon symposium included internationally recognized speakers from the Medical College of Wisconsin, University of Chicago and University of Washington. The meeting was very successful with over 80 delegates from the Chicago and Milwaukee areas.

Important research accomplishments included the awards of two new foundation grants to Dr. Patricia Loomis and the transfer of NIH R01 awards to Drs. Tseng and David Rademacher. Particular noteworthy successes included the publication of an article in *Nature* on a neuroprotective compound for Parkinson's disease by Dr. Gloria Meredith and her colleagues at Northwestern University, a book edited by Dr. Tseng, entitled, "Monoamine Modulation of Cortical Excitability" (published by Springer-Verlag) and a review article by Dr. Heinz Steiner in the highly cited journal, *Trends in Pharmacological Sciences*. Summer research opportunities brought medical students and one student from Lake Forest College to the laboratories of Drs. Marinelli, Rademacher and Steiner. We sadly, but proudly, bade farewell to Maud Morshedi and Ingo Willuhn, who successfully defended their doctoral dissertations in August and October, respectively. Maud returned to clinical clerkships in the Chicago Medical School to complete his medical training in order to earn his M.D./Ph.D. degree. Ingo completed his Ph.D. degree and is now a postdoctoral fellow in the lab of Dr. Paul Phillips at the University of Washington in Seattle. The department welcomed two new postdoctoral researchers in 2007: Dr. James McCutcheon joined our department in March to work with Dr. Marinelli, and Dr. Lijun Heng joined our department in April to work with Drs. Hu and Tseng. We also welcomed Alessandra Bonito-Oliva, a visiting student from Italy, to work in Dr. Marinelli's lab.

Our educational mission expanded in 2007 with the introduction of a new graduate program. We appointed a Director of Graduate Studies, Dr. Marinelli

and a committee to oversee graduate students. We also began development of a new advanced level graduate course called "Core Pharmacology". Our other advanced course, Neuropharmacology, continued under the capable directorship of Dr. Aron Mosnaim. Dr. Gary Oltmans further increased our emphasis on small group clinical case studies in the Medical Pharmacology course and Dr. Snyder continued her very able leadership of the Pharmacology course for Podiatric Medicine and College of Health Professions' students. Dr. Judy Potashkin directed our seminar series the first half of 2007 and Dr. Steiner in the second half of the year. These two faculty members were able to attract as speakers such well known scientists as Dr. John Disterhoft (Northwestern University), Dr. Maryka Quik (Parkinson's Institute in California), Dr. Jakie McGinty, (Medical University of South Carolina) and Dr. Therese Jay (University of Paris in France).

II. **Faculty Research Theme: *Integrative approaches to understanding neural plasticity, maladaptive learning and behavior***

Members of this department focus on neuropharmacological research. They are particularly interested in how drugs and other pharmacological tools alter brain chemistry, physiology, gene expression, and structure. The scope of the work and collaborative efforts by departmental members can be given by selecting a few highlights from 2007.

Several members of our department received invitations to speak about their research at key national meetings. We mention only a few of the many invitations: the first annual Julius Axelrod Symposium at the Society for Neuroscience (Dr. Marinelli), Winter Conference on Brain Research (Drs. Rademacher and Meredith), the LIMPE Symposium on Parkinson's disease research in Italy (Dr. Meredith), the American College of Neuropsychopharmacology (Dr. Rosenkranz), the Keystone Symposium on the Neurobiology of Addiction (Dr. Steiner) and the American Psychiatry Association's Annual Meeting (Dr. Tseng).

Research in this department has led to important, ground-breaking discoveries. For example, Dr. Potashkin in collaboration with Drs. Meredith and Loomis, uncovered significant changes in the quantity of splice variants of genes involved in dopamine processing and G-protein-linked receptors in a mouse model of Parkinson's disease, results published in the journal, Brain Research. Dr. Tseng, who just completed his first year in our department, began fruitful collaborations with Drs. Marinelli, Meredith, Hu and Wolf (Department of Neuroscience). These collaborations have already led to exciting new data that will be published in 2008 (stay tuned!). Dr. Steiner published two exciting new articles (European Journal of Neuroscience and Trends in Pharmacological Sciences) that revealed how chronic enhancement of dopamine transmission with cocaine and methylphenidate (Ritalin) change gene regulation in the forebrain, and how adolescent and adult brains regulate gene expression differentially. Dr. Rademacher published important works on the effects of stress

on natural reward (in collaboration with Dr. Cecilia Hillard at Medical College of Wisconsin and published in *Neuropsychopharmacology and Biological Psychiatry*) and the role of context in amphetamine addiction (in collaboration with Dr. Meredith and published in the *European Journal of Neuroscience*). Behavioral and physiological studies in drug addiction culminated in a publication in *Neuropsychopharmacology* (in press, late 2007) jointly authored by Drs. Marinelli, Meredith and Zahm, who is at St. Louis University School of Medicine. In this study, experimental animals learned to administer cocaine voluntarily using a prescribed schedule of drug exposure. After 6 days of drug exposure, the brains of these rats revealed significant activation of certain brain regions that were connected to the principal dopamine reward center (ventral tegmental area). Interestingly, centers in the brainstem important for locomotion and visceral control were activated by this behavioral paradigm of drug administration.

#### A. Publications in 2007

(Within each citation, faculty members' names are in bold, postdoctoral fellows in italics, and members of the technical staff are underlined.

Publications by graduate students are in Section III.)

##### Peer-reviewed articles in impact-rated journals:

Alibhai IN, Green TA, **Potashkin JA**, Nestler EJ. (2007) Regulation of fosB and  $\Delta$ fosB mRNA Expression: In Vivo and In Vitro Studies. *Molecular Brain Research* 1143: 22-33.

Chan CS, Guzman JN, Ilijic E, Mercer JN, Rick C, Tkatch T, **Meredith GE**, Surmeier DJ (2007) 'Rejuvenation' protects neurons in mouse models of Parkinson's disease. *Nature* 447: 1081-1086.

Cotterly L, Beverley JA, Yano M, and **Steiner H** (2007) Dysregulation of gene induction in corticostriatal circuits after repeated methylphenidate treatment in adolescent rats: Differential effects on zif 268 and homer 1a. *European Journal of Neuroscience* 25: 3617-3628.

Geisler S, **Marinelli M**, DeGarmo B, Becker ML, Freiman AJ, Beales M, **Meredith GE**, Zahm DS (2007) Prominent activation of brainstem and pallidal afferents of the ventral tegmental area by cocaine. *Neuropsychopharmacology*, ePub ahead of print.

**Hu X-T** (2007) Cocaine-induced neuroadaptations in ion channel function. Invited review for *Molecular Neurobiology* 35: 95-112.

Li X, Xi X, Zhou L, Catera D, Rote N, **Potashkin J**, Abdul-Karim F, Gorodeski GI (2007) Decreased Expression of P2X7 in Endometrial Epithelial Pre-Cancerous and Cancer Cells. *Gynecologic Oncology* 106: 233-243.

- Marinescu V, **Loomis PA**, Ehmann S, Beales M, **Potashkin JA** (2007) Regulation of retention of FosB intron 4 by PTB. PLoS ONE 2: e828.
- Morshedi MM and **Meredith GE** (2007) Differential laminar effects of amphetamine on prefrontal parvalbumin interneurons. Neuroscience 149: 617-624.
- Mosnaim AD**, Nguyen TD, Tse R, Puente J, Couceyro P, Wolf ME (2007) In vitro methionine-enkephalin degradation kinetics by human brain preparations. Neurochemical Research, ePub ahead of print.
- Potashkin JA**, Kang UJ, **Loomis PA**, Jodelka FD, Ding Y, and **Meredith GE** (2007) MPTP administration in mice changes the ratio of splice isoforms of fosB and rgs9. Brain Research 1182: 1-10.
- Rademacher DJ** and Hillard CJ (2007) Interactions between endocannabinoids and stress-induced decreased sensitivity to natural reward. Progress in Neuro-Psychopharmacology and Biological Psychiatry 31: 633-641.
- Rademacher DJ**, Napier TC, **Meredith GE** (2007) Context modulates the expression of amphetamine motor sensitization, cellular activation, and synaptophysin immunoreactivity. European Journal of Neuroscience 26: 2661-2668.
- Rosenkranz JA** and Johnston D (2007) State-dependent modulation of amygdala inputs by dopamine-induced enhancement of sodium currents in layer V entorhinal cortex. Journal of Neuroscience 27: 7054-69.
- Tseng KY**, Lewis BL, Lipska BK, O'Donnell P (2007) Post-pubertal disruption of medial prefrontal cortical dopamine-glutamate interactions in a developmental animal model of schizophrenia. Biological Psychiatry 62: 730-738.
- Tseng KY** and O'Donnell P (2007) D2 dopamine receptors recruit a GABA component for their attenuation of excitatory synaptic transmission in the adult rat prefrontal cortex. Synapse 61: 843-850.
- Tseng KY** and O'Donnell P (2007) Dopamine modulation of prefrontal cortical interneurons changes during adolescence. Cerebral Cortex 17: 1235-1240.
- Tseng KY**, Snyder-Keller A, O'Donnell P (2007) Dopaminergic modulation of striatal plateau depolarizations in organotypic corticostriatal co-cultures. Psychopharmacology 191: 627-640.

Yano M and **Steiner H** (2007) Methylphenidate and cocaine: the same effects on gene regulation? Trends in Pharmacological Sciences 28: 588-596.

Books, book chapters, and non-peer-reviewed publications:

Atzori M, Salgado H, **Tseng KY** (2007) Regulation of Cortical Functions by the Central Noradrenergic System: Emerging properties from an old friend. In: Monoaminergic Modulation of Cortical Excitability. **KY Tseng** and M Atzori (Eds), Springer, Berlin.

Grace, AA, **Rosenkranz JA**, West AR (in press) Electrophysiology. In: Textbook of Psychopharmacology, Fourth Edition. CB Nemeroff and AF Schatzberg (Eds), American Psychiatric Press, Washington, D.C.

**Marinelli M** (2007) Dopaminergic reward pathways and effects of stress. In: Stress and Addiction: Biological and Psychological Mechanisms, M al'Absi (Ed), Elsevier Science, Amsterdam, The Netherlands.

Paz RD and **Tseng KY** (2007) Monoamine-based Treatments in Schizophrenia: Time to Change the Paradigm? In: Monoaminergic Modulation of Cortical Excitability. **KY Tseng** and M Atzori (Eds), Springer, Berlin.

**Rosenkranz JA** (2007) Recent Advances in the Investigation of Plasticity of Neuronal Properties. In: Texas Neuroscience Review. J Ferrell (Ed.), University of Texas-Austin.

**Steiner H** (2007) Basal ganglia – cortex interactions: Regulation of cortical function by D1 dopamine receptors in the striatum. In: Monoaminergic Modulation of Cortical Excitability. **KY Tseng** and M. Atzori (Eds.), Springer, Berlin.

**Tseng KY** (2007) Acquiring the excitatory and the inhibitory action of dopamine in the prefrontal cortex during postnatal development. In: Monoaminergic Modulation of Cortical Excitability. **KY Tseng** and M Atzori (Eds.), Springer, Berlin.

**Tseng KY** and Atzori M (Eds.) (2007) Monoaminergic Modulation of Cortical Excitability, Springer, Berlin.

Abstracts:

Beales M, Conrad KL, Rudick CN, Unal CT, Cotterly LM, **Marinelli M** (2007) Persistent increases in cocaine seeking behavior and in dopamine neuron activity after acute exposure to cold swim stress. Keystone Symposium on Neurobiology of Addiction, Santa Fe, NM.

Blume S and **Tseng KY** (2007) Establishing a Mouse Model of Parkinsonism with Chronic Dopamine Deficits of the Mesocorticolimbic System. 5th Interdepartmental Neuroscience Retreat, RFUMS/Chicago Medical School.

Carr SB, Conrad KL, McCutcheon JE, Wolf ME, **Marinelli M** (2007) Elevated midbrain dopaminergic transmission in adolescent vs. adult rats: relevance to addiction. 37<sup>th</sup> Annual Society for Neuroscience Meeting, San Diego, CA.

Conrad KL, Beales M, Rudick CN, Unal CT, Cotterly LM, **Marinelli M** (2007) Persistent increases in cocaine seeking behavior and in dopamine neuron activity after acute exposure to cold swim stress. International Behavioral Neuroscience Society (IBNS), Rio de Janeiro, Brazil.

Conrad KL, **Marinelli M**, Wolf ME (2007) AMPA receptor trafficking in the nucleus accumbens in rats that display a time-dependent increase in cocaine-seeking behavior. Keystone Symposium on Neurobiology of Addiction, Santa Fe, NM.

Conrad KL, **Marinelli M**, Wolf ME (2007) AMPA receptor trafficking in the nucleus accumbens during the incubation of cocaine craving. International Behavioral Neuroscience Society (IBNS), Rio de Janeiro, Brazil.

Conrad KL, Uejima J, Shaham Y, **Marinelli M**, Wolf ME (2007) Role of nucleus accumbens GluR2-lacking AMPA receptors in incubation of cocaine craving. 37<sup>th</sup> Annual Society for Neuroscience Meeting, San Diego, CA.

*Heng LJ*, **Hu X-T**, **Tseng KY** (2007) Prefrontal Cortex Calcium Function Changes During Adolescence. 5th Interdepartmental Neuroscience Retreat, RFUMS/Chicago Medical School.

**Hu X-T** (2007) Decreased intrinsic excitability: neuroadaptation in voltage-gated ion channel function and signaling during cocaine withdrawal, Annual meeting of Society for Neuroscience, San Diego Convention Center, CA.

**Loomis P**, Wikle J, **Potashkin J** (2007) Regulation Of Fos B Pre-mRNA Splicing. Eukaryotic mRNA processing, Cold Spring Harbor, NY.

**Marinelli M**, Wolf ME, Conrad KL (2007) Greater excitability of midbrain dopamine cells in adolescent vs. adult rats. Keystone Symposium on Neurobiology of Addiction, Santa Fe, NM.

*McCutcheon JE*, Conrad KL, Carr SB, Wolf ME, **Marinelli M** (2007) Heightened dopamine cell activity may increase the risk of addiction in adolescents. Gordon Research Conference: Catecholamines, Magdalen College Oxford, United Kingdom.

**Meredith GE** and **Rademacher DJ** (2007) Amphetamine-induced conditioned place preference redistributes *Arc* in the basolateral amygdala and hippocampus. Society for Neuroscience Abstracts 33: in press.

**Meredith GE**, **Rademacher DJ**, Shen F, De Vries T (2007) Neural substrates of appetitive associative learning: new perspectives on drug seeking. Presented at the 40<sup>th</sup> Annual Winter Conference on Brain Research, Snowmass Village, CO.

Morshedi MM and **Meredith GE** (2007) Repeated amphetamine significantly elevates Fos expression and alters synapses in the medial prefrontal cortical pathway that projects to the lateral hypothalamus. Society for Neuroscience Abstracts 33: in press.

**Mosnaim AD**, Nguyen TD, Tse R, Wolf ME (2007) In vitro methionine-enkephalin degradation kinetics by human brain preparations. Society for Biological Psychiatry, San Diego, CA.

**Potashkin J**, **Loomis P**, Ding Y, Jodelka F, Jackolin J, Kang UJ, **Meredith G** (2007) Ache Splicing Regulation Is Disrupted In The Brain And Blood Of An MPTP Mouse Model Of Parkinson's Disease. Eukaryotic mRNA processing, Cold Spring Harbor, NY.

**Potashkin J**, **Loomis P**, Ding Y, Jodelka F, Jackolin J, Kang UJ, **Meredith G** (2007) Dysregulation of AChE splicing in acute and chronic models of Parkinson's disease. Neuroscience, San Diego, CA.

**Potashkin J**, Marinescu V, **Loomis P** (2007) The D1 Receptor Mediates  $\Delta$ fosB mRNA Expression in Postnatal Nucleus Accumbens Cultures. Keystone Addiction Meeting, Santa Fe, NM.

**Rademacher DJ**, Napier TC, **Meredith GE** (2007) Contextual modulation of motor sensitization, neuronal activity, and synaptogenesis in the amygdala and hippocampus. Presented

at the 37<sup>th</sup> Annual Society for Neuroscience Meeting, San Diego, CA.

Shen F, **Meredith GE**, Napier TC (2007) TrkB receptors in the hippocampus mediate the neuronal changes necessary for amphetamine-induced associative learning through NMDA receptors. Society for Neuroscience Abstracts 33: in press.

Siglin S and **Rademacher DJ** (2007) Effects of amphetamine conditioned place preference on synapse number in the basolateral amygdala. Presented at 2007 Chicago Medical School Summer Student Poster Presentation, North Chicago, IL.

**Tseng KY** and O'Donnell P (2007) Dopamine D2 inhibition of prefrontal cortex excitatory transmission is compromised in a developmental animal model of schizophrenia. International Congress on Schizophrenia Research, Colorado Springs, CO.

**Tseng KY**, McCallum S, Day M, Mallet N, Murer MG (2007) Beyond Dopamine Depletion: Neuronal Adaptations from Dopaminergic to Non-Dopaminergic Systems. 37th Winter Conference on Brain Research, Snowmass, CO.

Unal CT, Beverley JA, **Steiner H** (2007) Long-lasting dysregulation of gene expression in corticostriatal circuits after repeated cocaine treatment: Effects on zif 268 and homer 1a. 37th Annual Meeting of the Society for Neuroscience, San Diego, CA; Society for Neuroscience Abstracts, 33: 918.9.

Willuhn I and **Steiner H** (2007) Cocaine effects on motor learning in a novel running-wheel motor-learning paradigm. Keystone Symposium on Neurobiology of Addiction, Santa Fe, NM.

Willuhn I and **Steiner H** (2007) Striatum-based motor learning in a novel running-wheel task is altered by cocaine and dependent on D1 dopamine receptors. 9th Triennial Meeting of the International Basal Ganglia Society, Egmond aan Zee, Netherlands.

Willuhn I and **Steiner H** (2007) Cocaine stabilizes motor-skill memory consolidation mediated by the dorsal striatum. 37th Annual Meeting of the Society for Neuroscience, San Diego, CA; *Society for Neuroscience Abstracts*, 33: 913.25.

Yano M and **Steiner H** (2007) Methylphenidate effects on gene regulation: Same as cocaine? Not quite. 9th Triennial Meeting of the International Basal Ganglia Society, Egmond aan Zee, Netherlands.

Zhou L, **Potashkin J**, Qi X, Gorodeski GI (2007) Enhanced instability of P2X<sub>7</sub> mRNA in cancer epithelial cells. Eukaryotic mRNA processing, Cold Spring Harbor, NY.

## B. Research Seminars

Many faculty members have presented their work at international, national and local meetings and received invitations to give seminars or participate in symposia.

- Dr. Hu gave a seminar for the Department of Neurobiology and Physiology at Northwestern University, Evanston, IL.
- Dr. Marinelli was invited to speak at the 1<sup>st</sup> Annual Julius Axelrod Satellite Symposium at the Society for Neuroscience meeting, San Diego, CA; the Department of Molecular Pharmacology at Northwestern University, Chicago, IL; the Department of Pharmacological and Experimental Therapeutics at the Boston University School of Medicine, Boston, MA; the Impulse Control Disorders in Parkinson's Disease Workshop, Toronto, Canada; the Department of Pharmacological and Physiological Science at the Saint Louis University School of Medicine, St. Louis, MO; the Keystone Symposium on Neurobiology of Addiction, Santa Fe, NM; and the 40<sup>th</sup> Annual Winter Conference on Brain Research, Snowmass, CO.
- Dr. Meredith was invited to give Grand Rounds by the Department of Neurosurgery at the Kansas University School of Medicine. She was also invited to give talks at the LIMPE Seminars, Sardinia, Italy and the Department of Biology at Lake Forest College, Lake Forest, IL. Dr. Meredith also led a panel and spoke at the 40<sup>th</sup> Annual Winter Conference on Brain Research, Snowmass, CO.
- Dr. Mosnaim was invited to speak at the University of Chile.
- Dr. Potashkin presented a seminar at the 5<sup>th</sup> Annual Interdepartmental Neuroscience Retreat.
- Dr. Rademacher was invited to speak on a panel at the 40<sup>th</sup> Annual Winter Conference on Brain Research.
- Dr. Rosenkranz was asked to present at the Brudnick Research Institute at the University of Massachusetts Medical Center; the Department of Psychology at Boston College; and the American College of Neuropsychopharmacology in Boca Raton, FL.

- Dr. Steiner was invited to speak at the Keystone Symposium on Neurobiology of Addiction in Santa Fe, NM, and the 9<sup>th</sup> Triennial Meeting of the International Basal Ganglia Society in Egmond aan Zee, Netherlands.
- Dr. Tseng gave presentations at the 5<sup>th</sup> Interdepartmental Neuroscience Retreat at Rosalind Franklin University of Medicine and Science, North Chicago, IL; the Seminar Series at the Stark Neurosciences Research Institute, Institute of Psychiatric Research at the Indiana University School of Medicine, Indianapolis, IN; the Department of Physiology at the University of Buenos Aires School of Medicine, Buenos Aires, Argentina; the Department of Neurology, Cognitive Neurology and Neuropsychiatry Section, FLENI, Buenos Aires, Argentina; the American Psychiatry Association's Annual Meeting, San Diego, CA; and the Department of Physiology and Biophysics at Rosalind Franklin University of Medicine and Science, North Chicago, IL.

### C. Research Grants and Contracts

In 2007, faculty in the pharmacology department held a total of 9 federally funded grants and 1 foundation grant.

- Dr. Loomis – Deafness Research Foundation
  - Splice Regulation of Pre-mRNA Generated from the Deafness Associated Espin Gene
- Dr. Marinelli – NIH/NIDA
  - Adolescent Cocaine Abuse: Electrophysiology & Behavior
- Dr. Meredith – NIH/NIDA
  - Mechanisms Underlying Reward-Related Synaptogenesis
- Dr. Meredith and Dr. Potashkin – Department of Defense
  - Identification of Splice Variants as Molecular Markers of Parkinson's Disease
- Dr. Meredith - NIH Subcontract
  - Rejuvenation of SNC DA Neurons and Neuroprotection
- Dr. Potashkin – NIH/NIDA
  - Cocaine Regulation of FOSB Splicing
- Dr. Rademacher – NIH/NIDA
  - CART Peptide Modulation of Stimulant Reward

- Dr. Steiner – NIH/NIDA
  - Basal Ganglia Output and Psychostimulant Abuse
- Dr. Tseng (and Dr. Hu) – NIH/NIDA
  - Cocaine and Mesolimbic Dopamine

#### **D. Research Collaborations**

Several members of the Pharmacology Department collaborated with colleagues at the Chicago Medical School:

- Dr. Marinelli continued her collaboration with Dr. Marina Wolf, of the Department of Neuroscience, studying mechanisms underlying cocaine craving and addiction.
- Dr. Potashkin and Dr. Meredith continued their work on the identification of splice variants in Parkinson's disease.
- Dr. Rademacher and Dr. Meredith continued to collaborate on various projects on associative learning with amphetamine.
- Dr. Steiner continued his collaboration with Dr. Anthony West of the Department of Neuroscience studying motor learning with cocaine.
- Dr. Tseng began working with Drs. Marina Wolf and Tony West of the Department of Neuroscience and with Dr. Marinelli in our department.

Research with others outside the University:

- Dr. Marinelli continued collaborating with Dr. McGehee of University of Chicago.
- Dr. Meredith continued her work with Dr. Jim Surmeier of Northwestern University.
- Dr. Mosnaim continued collaborations with Dr. Marion E. Wolf of the International Neuropsychiatry Consultants, Drs. Javier Puente and M. Antonieta Valenzuela of the University of Chile, Dr. John Somberg of Rush University, and Dr. Seymour Diamond of the Diamond Headache Clinic.
- Dr. Potashkin collaborated with Dr. Eric Nestler of the University of Texas Southwestern Medical School (FosB splicing) and Dr. George Gorodeski of Case Western Reserve University (splicing in cancer).

- Dr. Rademacher continued his work with Dr. Cecilia Hillard of the Medical College of Wisconsin studying stress.
- Dr. Steiner continued his collaboration with Dr. Barry E. Kosofsky, Chief of the Division of Child Neurology at Weill-Cornell Medical College/New York Presbyterian Hospital. Dr. Steiner also began new collaborations with Dr. Mathias Jucker of the University of Tuebingen in Germany and with Dr. Michelle Ehrlich of the Mount Sinai School of Medicine in New York.
- Dr. Snyder continued her work with Dr. Samina Hijab and Dr. Suresh Havalad of the Pediatric Critical Care Fellowship of Advocate Lutheran General Children's Hospital.
- Dr. Tseng continued collaborating with Dr. Hu of Rush University.

#### **E. Grant/Manuscript Reviews and Editorial Boards:**

- Dr. Marinelli served as an ad hoc reviewer for the NIH study section for Neurobiology of Motivated Behavior. She also served as a grant reviewer for the NIH/NIDA RFA on Extinction and Pharmacotherapies for Drug Addiction; the NIH special emphasis panel, Centers Review Committee; and the Neurological Foundation of New Zealand Project.
- Dr. Meredith is a regular member of the NIH study section for NMB. She also served as a grant reviewer for the Silvio O. Conte Centers for Neuroscience Research.
- Dr. Mosnaim is a member of the Editorial Boards of the *American Journal of Therapeutics*, the *Headache Quarterly Current Treatment and Research*, and the *Research Communications in Substance of Abuse*. He also served as a grant reviewer for the National Headache Foundation, the Chilean Science Research Council, the State of Illinois Department of Public Health's Alzheimer Disease Fund, and the University of Chile Research Grants.
- Dr. Potashkin served as a grant reviewer for the Pennsylvania Interim Review, 2<sup>nd</sup> Panel.
- Dr. Steiner is a member of the Editorial Board of *Substance Abuse: Research and Treatment*, and he served as a grant reviewer for the Medical Research Council in the UK.

- Dr. Tseng served as a grant reviewer for the Neurological Foundation of New Zealand.
- Faculty members have reviewed scientific papers for a variety of journals covering the fields of pharmacology and neuroscience, including:

*European Journal of Neuroscience, Neuropsychopharmacology, Neuroscience, Clinical Neurophysiology, Journal of Neuroscience, Psychopharmacology, Journal of Biological Chemistry, Progress in Neuro-Psychopharmacology and Biological Psychiatry, Biochemical Pharmacology, Behavioral Neuroscience, Biological Psychiatry, etc.*

### III. Graduate and Medical Student Accomplishments

#### A. Presentations and Publications in 2007 (graduate and medical students' names are in bold; research staff names are underlined):

**Morshedi MM** and Meredith GE (2007) Differential laminar effects of amphetamine on prefrontal parvalbumin interneurons. *Neuroscience* 149: 617-624.

**Morshedi MM** and Meredith GE (2008) Repeated amphetamine administration induces Fos in prefrontal cortical neurons that project to the lateral hypothalamus but not the nucleus accumbens or basolateral amygdala. *Psychopharmacology*, 197: 179-189.

**Morshedi MM** and Meredith GE (2007) Repeated amphetamine significantly elevates Fos expression and alters synapses in the medial prefrontal cortical pathway that projects to the lateral hypothalamus. *Society for Neuroscience Abstracts* 33:421.2.

**Siglin S** and Rademacher DJ (2007) Effects of amphetamine conditioned place preference on synapse number in the basolateral amygdala. Presented at 2007 Chicago Medical School Summer Student Poster Presentation, North Chicago, IL.

Topic B, **Willuhn I**, Palomero-Gallagher N, Zilles K, Huston JP, Hasenöhrl RU (2007) Impaired maze performance in aged rats is accompanied by increased density of NMDA, 5-HT1A, and alpha-adrenoceptor binding in hippocampus. *Hippocampus* 17: 68-77.

**Willuhn I** and Steiner H (2007) Cocaine effects on motor learning in a novel running-wheel motor-learning paradigm. *Keystone Symposium on Neurobiology of Addiction*, Santa Fe, NM.

**Willuhn I** and Steiner H (2007) Striatum-based motor learning in a novel running-wheel task is altered by cocaine and dependent on D1 dopamine receptors. 9th Triennial Meeting of the International Basal Ganglia Society, Egmond aan Zee, Netherlands.

**Willuhn I** and Steiner H (2007) Cocaine stabilizes motor-skill memory consolidation mediated by the dorsal striatum. 37th Annual Meeting of the Society for Neuroscience, San Diego, CA; Society for Neuroscience Abstracts, 33:913.25.

## B. Awards, Grants, and Degrees

- Maud Morshedi, advised by Dr. Meredith, successfully defended for the PhD degree in August.
- Ingo Willuhn, advised by Dr. Steiner, successfully defended for the PhD degree in October.

## C. Medical Students Carrying Out Research in our Laboratories:

Several medical students spent time carrying out research in our labs either in the summer or throughout the year. **Steven Carr** (M-2A) and **Harbinder Khangura** (M-2) spent time working in Dr. Marinelli's lab throughout the year. **Dahlia Tawfik** (M-2) and **Henry Koh** (M-2) spent time working in Dr. Steiner's lab. **Scott Siglin** (M-2) began working with Dr. Meredith and Dr. Rademacher in June as part of a Summer Research Fellowship program, and continued working in the lab after the fellowship ended.

## IV. Postdoctoral Fellows

Dr. James McCutcheon arrived in March from the University of Sussex, BSc and University College in London to work with Dr. Marinelli.

Dr. Lijun Heng arrived in April from the Fourth Military Medical University in China to work with Drs. Hu and Tseng.

## V. Accomplishments in Education

Our Department is responsible for providing two major Pharmacology courses for the Medical School and Colleges of Podiatric Medicine and Health Professions. The Foundations of Medical Pharmacology in the Medical Curriculum is directed

by Dr. Oltmans, with Dr. Potashkin assisting as co-director. Over the past few years, we have gradually introduced a number of small group sessions for discussion of clinical scenarios that include a particular class of drugs, such as the medications for hypertension, cardiac, asthma, neuropsychopharmacology, Parkinson's disease, cancer and diabetes. These discussion groups, along with the pharmacology shelf exam introduced for the first time in 2007, have proven to be very successful learning aids for our students. The efforts of all the faculty in the Medical Pharmacology course have paid off over the years, as the Medical Students have consistently scored above the national mean in Pharmacology for step I of the USMLE exam. The Pharmacology course for students in the Dr. William M. Scholl College of Podiatric Medicine and the College of Health Professions was directed by Dr. Snyder. The organization and Dr. Snyder's leadership of this course have been highly praised by the students. Students have also done consistently well on national exams of their respective professions.

Dr. Marinelli is our Director of Graduate Studies for the department. She has worked with a committee of faculty to improve our graduate curriculum for Pharmacology. We continue to offer Neuropharmacology, which is directed by Dr. Aron Mosnaim and will shortly offer a new course, Core Pharmacology, at the graduate level. The latter will be directed by Dr. Oltmans.

Outside the courses named above, faculty members also lecture in the Board Review Course, CPR, directed by Dr. Gordon Pullen. Dr. Oltmans co-chaired the Year 1-2 committee for curriculum revision in the Medical School and the Educational Affairs Committee in 2007. Dr. Snyder co-chaired the Y3-4 committee. Most of our faculty members served on one or more of the curriculum integration committees entitled, 'Vertical Integration Committees' in the Medical School.

Most faculty members served our mission in graduate education by serving on or chairing prelim and doctoral dissertation committees in different departments and programs including our own.

## **VI. Accomplishments in Service**

Faculty members of the Cellular and Molecular Pharmacology Department have been good University citizens this past year by chairing or serving on many different committees in the Department, Medical School and University. In addition, all our faculty members freely gave of their time to interview potential students for the Medical School on at least 6 different mornings.

Our departmental committees included the Appointments, Promotions and Tenure (AP&T) Committee chaired by Dr. Potashkin the first half of 2007 and by Dr. Oltmans in the second half of the year, the Space and Equipment Committee

chaired by Dr. Steiner, the Graduate Studies Oversight Committee chaired by Dr. Marinelli, the Workload Plan Committee, chaired by Dr. Tseng, and the Retreat Committee comprised of Mitch Beales, Sue Wilson, and Drs. Loomis, Meredith, and Potashkin. All tenured members of our faculty as well as Dr. Barsano, an adjunct member of our department, serve on our AP&T Committee, Drs. Snyder and Marinelli served on the Space Committee.

In the School and University, faculty members chaired certain committees. Dr. Potashkin served as our Senator and chaired the Faculty Awards Committee for the Senate and Dr. Meredith chaired the Pharmacy School Committee. All our faculty members served on many different Medical School and University Committees including Radiation Safety, Institutional Animal Care and Use Committee, University Research Committee, Research Review Board, Educational Affairs Committee, Appointments, Medical School Admissions, Medical School Strategic Planning, Medical School Recruitment and Retention, Medical School Scholarship, EAC, Faculty Appointments, Promotion and Tenure Committee (Medical School), Graduate Admissions, SEPAC, etc.

Dr. Potashkin was Director of the RNA Quantification Research Support Laboratory and Dr. Loomis was the Facility's Manager. Dr. Meredith was Director the Electron Microscopy Center.

Faculty members also served the University at local or national levels. Drs. Hu and Snyder each served as Councilor for the Great Lakes Chapter of ASPET; Dr. Marinelli was one of the Directors of "Chicago Dopamine" and served as Secretary of the local chapter of the Society for Neuroscience. Dr. Meredith served on the Nominating Committee for the Great Lakes Chapter of ASPET.

In Community Service, Dr. Marinelli gladly gave of her time to present seminars on drug addiction to local High Schools in Lake County and Dr. Meredith gave a seminar at Lake Forest College.

## **VII. Department Retreat**

The department held its first annual retreat on April 20th at the Illinois Beach Resort and Conference Center. The retreat included short scientific talks by Drs. Potashkin, McCutcheon and Tseng, and a presentation on using online tools for education by Mitch Beales. We had an excellent presentation by Dr. Tim Hansen, VP for Academic Affairs, on Faculty Governance and an informative session on electronic grant submission by Drs. Loomis and Potashkin. We ended the formal sessions with a fun "team building" exercise (photos are on our bulletin board – please come have a look). The social at the end of the day gave everyone time to relax and mingle. All-in-all, the retreat was rated successful!

## VIII. Challenges

There are a number of challenges that our Department and its members face in the years to come.

- First and foremost is the limited funding that has become the 'norm' for NIH. This is a challenge that is universal to the scientific community and one which we are keenly aware. To overcome this obstacle, our productivity is up, we are mentoring our young investigators in grants(wo)manship and collaborations are increasing both within and outside the department. We introduced new sources of revenue (Foundation Grants) as a topic at our annual retreat in 2008. All of these approaches can help us weather the tight, funding scene.
- Another challenge lies in the recruitment of new faculty. We successfully recruited Dr. Tseng in 2006 and Dr. Rosenkranz in 2007 and will be looking seriously at high quality candidates in the next academic year. We feel that Rosalind Franklin University is more competitive now than ever and we feel confident that we as a Department have much to offer new recruits.
- Another challenge is the declining enrollment in the Graduate Program. Since there are dwindling numbers of young people entering scientific research, this may remain a challenge in the foreseeable future. As a Department, we need to look to our strengths in facing this challenge. Through the new umbrella IGPBS program, we hope to attract new graduate students into pharmacology. We have an advantage over many other fields by training for academic and industrial research. We also continue to have medical students and undergraduate students from local colleges working in our laboratories over each summer.