

**ROBERT BENNET GIBBS**

Office Address: Department of Pharmaceutical Sciences  
University of Pittsburgh School of Pharmacy  
Pittsburgh, PA 15261  
TEL (412) 624-8185  
FAX (412) 624-1850

Date of Birth: May 8, 1959

**EDUCATION**

1977-1981	Univ. of Rochester, Rochester, NY	BS Neuroscience
1977-1981	Univ. of Rochester, Rochester, NY	BA Philosophy
1981-1987	Univ. California, Irvine, Irvine, CA	Ph.D. Biological Sci.

**APPOINTMENTS AND POSITIONS**

11/04-	Chair of Graduate Program Council, University of Pittsburgh School of Pharmacy
9/1/04-	Professor of Pharmaceutical Sciences, University of Pittsburgh School of Pharmacy
7/1/99-	Secondary appointment in the Department of Cell Biology and Physiology, University of Pittsburgh School of Medicine
7/1/97-8/31/04	Associate Professor of Pharmaceutical Sciences, University of Pittsburgh School of Pharmacy, with a secondary appointment to the Department of Neurobiology, University of Pittsburgh School of Medicine
1/1/97-	Director of the Cell Imaging Core for the Center for Reproductive Physiology
7/93-6/97	Assistant Professor of Pharmacy & Therapeutics, University of Pittsburgh School of Pharmacy, with a secondary appointment to the Department of Neurobiology, University of Pittsburgh School of Medicine
7/90 - 6/93	Assistant Professor, The Rockefeller University, Laboratory of Neurobiology & Behavior
1989-1990	Research Associate, The Rockefeller University, Laboratory of Neurobiology & Behavior
1987 - 1989	Postdoctoral Fellow, The Rockefeller University, Laboratory of Neurobiology & Behavior



**Doctoral Major Advisor/Co-Advisor (Cont'd)**

Rebecca Hammond  
 Ph.D. Student  
 Department of Pharmaceutical Sciences  
 University of Pittsburgh School of Pharmacy  
 Thesis:

**Thesis/Dissertation Committee Member**

Heather Cameron Ph.D. Student The Rockefeller University	Graduation	May 1995
Xinru Hu M.S. Student Department of Pharmaceutical Sciences University of Pittsburgh School of Pharmacy	Graduated	May 1998
Young Song Ph.D. Student Department of Pharmaceutical Sciences University of Pittsburgh School of Pharmacy	Graduated	April 2000
Christopher Bolcato M.S. Student Department of Pharmaceutical Sciences University of Pittsburgh School of Pharmacy	Graduated	July 2003
Michael Tortorici Ph.D. Student Department of Pharmaceutical Sciences University of Pittsburgh School of Pharmacy	Graduated	May 2007
Nicholas Fitz Ph.D. Student Department of Pharmaceutical Sciences Duquesne University School of Pharmacy	Anticipated Graduation	August 2008
Phebian Abitoye M.S. Student Department of Pharmaceutical Sciences Duquesne University School of Pharmacy	Graduated	May 2008
Samreen Arshad M.S. Student Department of Pharmaceutical Sciences Duquesne University School of Pharmacy	Graduated	May 2007

**Thesis/Dissertation Committee Member (Cont'd)**

Jenny Zhang PhD Student Department of Pharmaceutical Sciences University of Pittsburgh School of Pharmacy	Anticipated Graduation	August 2007
--	------------------------	-------------

**Graduate Course Development**

Course 3026 – Pharmacy Literature Review	“Topics in Neuroscience” (1994-)
Course 3038, 3039 – Essentials of Competitive Grant Writing (2003-)	

**Undergraduate Course Development**

Advanced Pharmacy Practice 1700 Profession of Pharmacy	“Brain Function and Disease” (1995 -1997)
---	---

**Team Taught Graduate Courses**

Course 3429	“Neuropsychology Module” (1997-1998)
Course 3009	“Advances in Pharmaceut. Sciences” (1997-)
Course 2001	“Pharmaceutical Analysis” (1998- )
Course 3024, 3025	"Pharmaceutical Sciences Seminar" (1998-)
Course 3000 (Journal Club)	"Topics in Neuroscience" (2000-2003)

**Team Taught Undergraduate Courses**

Contemporary Pharmacy Practice 1490	“Over-the-Counter Drugs” (1996-1997)
-------------------------------------	--------------------------------------

**Post-Baccalaureate Pharm.D. Courses**

Advanced Pharmacotherapy 3405	Neuropsychology Module
-------------------------------	------------------------

**Residents Research Series**

“What is an hypothesis?”	Fall 2004, 2005
--------------------------	-----------------

**Team-Taught Entry-Level Pharm. D. Courses**

Course 5110, 5111	Profession of Pharmacy (1997- ) “Ethical Decision Making” “Pharmaceutical Sciences Research”
Course 5319	Advanced Pharmacotherapy - Neurology and Psychiatric Module (1998-)
Course 5213	Experiential Learning

### **Graduate Student Trainees**

Ahmad Hashash, 1995-1996  
Alexis Burke, 1996-1998  
Payal Aggarwal, 1997-2000  
Rose Mantella, 1999-2000  
Fulvio Plescia, (visiting scholar) 2006  
Mauro Gagliano, (visiting scholar) 2006  
Antonio Agazio (visiting scholar) Summer 2008

### **Undergraduate Student Trainees**

Amy McMichael, Summer Term, 1994  
Greg Keidan, Summer Term, 1995  
Teresa Lutka, Summer Term, 1995  
Christine Martynowski, Summer, Fall and Spring Terms, 1995-1996  
Sarah Sung, Summer Term, 1997  
Cathy Peng, Summer Term, 1997  
Stacy Szymanski Summer Term, 1999  
Mylaina Gordon Summer Term, 2000  
Brandon Nornhold Summer Term, 2001  
Rachel Gabor (Juniata College), Summer Term, 2001, 2002, 2003  
Kristal Milo Summer Term, 2002  
Nora Watson (Cornell University; Ithaca, NY), Summer Term, 2002  
Jasmine Talameh, Spring Term, 2003, Summer 2004, GEAR-UP student  
Nicole Lazar, GEAR-UP Student, Summer Term, 2003  
Wes Hartman Spring term 2005  
Josh Galilei Summer term 2005, GEAR-UP student  
Emily Hayes-Rowan Summer term 2005  
Marta Sheremeta – Fall and spring terms 2005-2006  
Chante Richardson – Spring Term 2006  
David Ninaci – 2007-2008  
Alex Buckley – Fall 2007  
Beth Foreman – Spring 2008  
Katherine Sommerer – Summer 2009

### **Postdoctoral Training**

Julie Pongrac, Ph.D. (1999-2000)

### **Graduate-Level Workshops**

Electronic Imaging Workshop (1998- )  
Computer Resources for Managing References and Bibliographies (2000- )  
Statistics Workshop (organized only; 1999)  
Preparing Posters with Power Point (2002- )

### **Continuing Education Courses**

Introduction to the Neurobiology of Seizure Disorders – 1 Credit  
Lecture presented at Seven Springs Mountain Resort, May 30, 1998.

**Partnership for Education - Health Sciences Consortium (1999-2001)**

Provide opportunity for high school students to visit my laboratory and to learn about research and career opportunities in Neuroscience.

**Portfolio Advisory Group (1994-1996)**

**UNIVERSITY OF CALIFORNIA, IRVINE, 1982-1986**

**Team Taught Undergraduate Course**

Psychobiology Laboratory 105 - 1982-1986

**THE ROCKEFELLER UNIVERSITY, 1987-1993**

**Team Taught Graduate Course**

Neuroendocrinology - 1990-1991

**Graduate Educational Research**

Noriyuki Koibuchi, Postdoctoral Fellow, Dokkyo University, Japan – 1990-1991

Nicole Chastrette, Postdoctoral Fellow, The Rockefeller University – 1991-1992

H. James Okano, Graduate Student, Jintendo University School of Medicine, Japan  
(visiting graduate student at The Rockefeller University 1991-1993)

**PROFESSIONAL DEVELOPMENT**

2004-2005    AACP Leadership Fellowship Program (ALFP)

**SERVICE****NIH STUDY SECTION PARTICIPATION**

1997	Member of a Special Interest Panel for the review of pilot study applications for the National Institute on Aging, NIH
10/98	Reviewer for NIH Study Section BDCN-2
12/98	Member of NIH Site Visit Team
3/98	Reviewer for NIH Study Section to review applications for NIA funded Older American Independence Centers
2001-2003	Reviewer for NIH Study Section MDCN-2
2002	Reviewer for NIA-N Study Section
2003-2006	Reviewer for NIH Study Section NDBG (formerly MDCN-2)
2003	Reviewer for NIH Special Emphasis Panel to review Morrison P01
2004	Reviewer for NIH Special Emphasis Panel to review Morrison P01-A1
2004	Reviewer for NIH Special Study Section ZRG1 IFCN-D-02 S

**COMMITTEES****SCHOOL OF PHARMACY**

1993-1994	Pharm. D. Admissions Committee
1993-1995	Code of Conduct Committee
1994-1995	Math and Scientific Comprehension Subcommittee
1993-2000	Admissions Committee
1994-	Scientific Review Committee (Chair, 1996-)
1995-	Seminar Committee (Chair, 1995-)
1996-1997	TA Task Force Committee
1996-2001	Graduate Program Committee
1996-2001	Overseeing access and administration of Current Contents on Diskette database for the School
1998-2001	Department Executive Committee
1998-2000	Research Planning Committee
2001	Research Retreat Planning Committee
2001	Search Committee for Surgery Position in Pharmacy & Therapeutics
2001	Gear-Up Mini-Graduate School (Director/Organizer)
1994-2003	Departmental Seminar Series (Organizer)
2001-2004	Distinguished Lecture Series (Organizer)
2001-	Wide Format Printer (Manager/Coordinator)
2002-	Gear-Up Organization Committee
2003	Tops Orientation Committee
2004-	Graduate Program Council (Chair)
2004-2005	Leadership team
2005-	IT Advisory committee
2006	Student seminar series (Spring term; organizer)
2007-	Promotions and Tenure Committee
2007-	Drug Delivery Faculty Search Committee
2008-	Critical Care Faculty Search Committee
2008-2009	Self study – Standards 4-8

## **UNIVERSITY OF PITTSBURGH**

1995-1998	Faculty Assembly
1996-1998	Senate Council
1996	Senate Nominating Committee for Senior Vice Chancellor of the Health Sciences
1997	Member of a Grievance Panel convened by the Office of the Provost
1999-2002	Faculty Assembly
2000-2002	Senate Council
2002-2004	Senate Computer Usage Committee (Ad Hoc member)
2003-2006	Biohazard Committee
2003-2007	University Council on Graduate Studies Advancing Research in the Public Schools

## **PROFESSIONAL MEETINGS / SOCIETIES**

2005-2006	Chair of the local organizing committee for the annual meeting of the Society for Behavioral Neuroendocrinology, Pittsburgh, PA, June 17-19, 2006.
2005-2006	Member of the program committee for the quadrennial meeting of the International Neuroendocrine Federation, Pittsburgh, PA, June 19-22, 2006.
2007	Co-organizer of "Expert Meeting on Hormones, Cognitive Function, and Dementia", Beaumanor Hall, Woodhouse Leicestershire, United Kingdom, March 19-20, 2007.

## **REVIEWER**

### Journal Reviewer

1994-	Journal of Neuroscience
1994-	Experimental Neurology
1995-	Neuroscience
1995-	Brain Research
1996-	J. Neurobiology
1996-	Brain Research Bulletin
1997-	Hormones & Behavior
1998-	Neurobiology of Aging
1999-	Neuroendocrinology
2000-	Biological Psychology
2001-	American Journal of Psychiatry
2002-	Behavioral Neuroscience
2002-	Neurobiology of Learning and Memory
2003-	Endocrinology
2003-	Behavioral Neuroscience
2004-	Animal Cognition
2004-	Psychoneuroendocrinology
2005-	J. Neuroendocrinology
2006-	PNAS
2006-	Cerebellum
2009-	Expert Review of Endocrinology & Metabolism
2009-	Behavioural Pharmacology
2009-	Behavioural Processes

**REVIEWER (CONT'D)**

Granting Agency Reviewer

1994- National Science Foundation  
1998- National Institutes of Health  
2002 Louisiana Board of Regents Support Fund - Research and Development Program  
2002- Department of Veteran's Affairs Medical Research Service

Outside Thesis Reviewer

Sophie Elise Ping  
Ph.D. Student  
University of Melbourne

## PRESENTATIONS

### INVITED LECTURES, outside University of Pittsburgh

Estrogen and Fos Expression in Brain

The Japanese Endocrine Society

Hokkaido University, Hokkaido, Japan; October 1989

Use of In Situ Hybridization Techniques to Detect Low-Abundant mRNAs in Brain

Istituto Superiore de Sanita in Rome, Italy; September 1990

Interactions Between Estrogen and NGF-Related Systems in Brain

New York Academy of Sciences

New York, NY; November 10, 1992

Interactions Between Estrogen and NGF-Related Systems in Brain

Presented as part of a colloquium entitled, "Colloquium in Biopsychology: Hormonal Restructuring of the Adult Brain"

Hunter College, New York, NY; March 30, 1993

Interactions Between Estrogen and NGF-Related Systems in Brain

Presented as part of a workshop entitled, "Sex Hormones, Aging, and Mental Illness" sponsored by the National Institute of Mental Health

Washington, DC; September 26, 1994

Interactions Between Estrogen and NGF-Related Systems in Brain

Department of Pharmaceutical Sciences

Duquesne University School of Pharmacy

Pittsburgh, PA; December 14, 1994

Interactions Between Estrogen and NGF-Related Systems in Brain

Department of Physiology

University of Maryland School of Medicine; February 17, 1995

Estrogen and Cholinergic Function: Implications for Brain Aging and Cognitive Decline

Wyeth Ayerst, Inc., Radner, PA, May 8, 1997

Estrogen and Cholinergic Function: Implications for Brain Aging and Cognitive Decline

Novo Nordisk, Inc., Copenhagen, DM, May 15, 1997.

Effects of Estrogen and Aging on Cholinergic Neurons in the Basal Forebrain

The Third Annual Graylyn Conference

Women's Cognitive Health: The Role of Estrogen

Sponsored by the Women's Health Center of Excellence at the Wake Forest University-Baptist Medical Center, Winston-Salem, NC, October 15-17, 1997

**INVITED LECTURES: (Continued)**

Effects of Estrogen on Brain Cholinergic Neurons and Growth Factors: Implications for Estrogen Replacement Therapy in Postmenopausal Women

Department of Pharmaceutical Sciences  
Duquesne University School of Pharmacy  
Pittsburgh, PA; September 24, 1998.

Effects of estrogen on basal forebrain cholinergic neurons and behavior: Implications for estrogen replacement therapy in postmenopausal women

The Novartis Foundation  
London, UK; September 7, 1999.

Effects of estrogen and progesterone on brain function and cognition: Implications for hormone replacement therapy in postmenopausal women

Wyeth Ayerst, Inc., Radner, PA, December 9, 1999.

Potential mechanisms for the effects of estrogen on cognitive processes: Role of basal forebrain cholinergic projections

US/Japan International Symposium on Neuroplasticity, Development and Steroid Hormone Action  
University of Hawaii at Manoa  
Oahu, Hawaii; September 26-29, 2000.

Estrogen and brain cholinergic neurons: Implications for effects of hormone replacement therapy on age-related cognitive decline in women

Department of Pharmacology and Therapeutics  
University of South Florida College of Medicine  
Tampa, FL; March 27-28, 2001.

Mechanisms of Tibolone Action in the Brain

Tibolone Mechanism of Action Experts' Meeting  
Organon Pharmaceuticals, Inc.  
Dallas, Texas; November 16-17, 2001

Effects of Estrogen on Cognition - Preclinical Studies

WHIMS Scientific Advisory Board Meeting  
Wyeth Pharmaceuticals, Inc.  
Philadelphia, PA; March 17, 2003

Estrogen and cognitive performance: Basic and clinical findings

Presented at ASPET symposium titled, "Trophic Effects of Estrogen in the Brain: Protection for Memory, Aging and Neurodegenerative Disease  
Federation of American Societies for Experimental Biology (FASEB) 2003  
San Diego, CA; April 12, 2003

**INVITED LECTURES: (Continued)**

Estrogen, cholinergic function, and cognition  
85<sup>th</sup> Annual Meeting of The Endocrine Society  
Philadelphia, PA; June 19, 2003

Estrogen and progesterone: Effects on cholinergic neurons and cognitive performance  
The Ninth Annual Graylyn Conference on Women's Cognitive Health  
Sponsored by the Women's Health Center of Excellence at the Wake Forest University-  
Baptist Medical Center, Winston-Salem, NC, October 29-31, 2003.

Hormone therapy and cognitive performance: Reconciling animal studies with clinical data  
Bench to Bedside: Estrogen as a Case Study  
Sponsored by the National Institute on Aging Neuroscience and Neuropsychology of  
Aging Program. Co-sponsored by NIMH and the Alzheimer's Association.  
Washington, D.C., September 28-29, 2004.

Estrogen therapy and cognitive performance: Myths and mysteries  
Department of Psychology and Neuroscience Program  
University of Illinois at Champaign  
Champaign, IL; April 18, 2005

Estrogen, Brain Aging, and Cognition: Where do we go from here?  
Behavioral Neuroscience and Neurology  
Oregon Health & Science University  
Portland, OR; April 29, 2005

Hormones and Cognition: What the Animals are Telling Us  
The Tenth Annual Graylyn Conference on Women's Cognitive Health  
Sponsored by the Women's Health Center of Excellence at the Wake Forest University-  
Baptist Medical Center, Winston-Salem, NC, October 26-28, 2005.

Cholinergic Neurons, Hormone Therapy, and Age-Related Cognitive Decline: Preclinical  
Studies  
The Fifth International Conference on Geriatric Psychoneuropharmacology  
University of Pittsburgh, Pittsburgh, PA, November 2-5, 2005.

Estrogen and Cognition: Reconciling Clinical Trials with Preclinical Data  
Seminar in Neuroscience  
School of Graduate Studies  
SUNY Downstate Medical Center  
Brooklyn, NY; December 7, 2005

Gonadal Hormones, Brain Aging, and Cognition  
University of Minnesota College of Pharmacy  
Minneapolis, MN; October 26, 2006

**INVITED LECTURES: (Continued)**

Gonadal Hormones, Brain Aging, and Cognition  
West Virginia University College of Pharmacy  
Morgantown, WV; November 8, 2006

Hormones and Cognition: What the Animals are Telling Us  
Graduate Program in Neuroscience  
Department of Neurobiology and Behavior  
SUNY Stony Brook  
Stony Brook, NY; December 15, 2006

Estradiol and Cognition: Lessons from Animal Studies  
Hormones, Cognitive Function, and Dementia  
Expert Meeting  
Beaumanor Hall, Woodhouse  
Leicestershire, United Kingdom  
March 19-20, 2007

Hormones and Cognition: The Real Story  
Neuropathology Department  
Case Western Reserve University  
Cleveland, OH; May 21, 2007

Mechanisms of Estrogen Effects on Cognitive Aging  
10th Annual Symposium of the Center for Neuroendocrine Studies  
University of Massachusetts, Amherst  
Amherst, MA; October 5, 2007

Role of Estrogen in Cholinergic Function in Relation to Effects on Cognitive Performance  
38th Annual Meeting of the American Aging Association  
Hotel Valley Ho  
Scottsdale, AZ; May 29-June 1, 2009

**INVITED LECTURES**, within University of Pittsburgh

Interactions Between Estrogen and NGF-Related Systems in Brain  
Center for Reproduction at the University of Pittsburgh Medical Center  
December 15, 1994.

Estrogen and Cholinergic Function: Implications for Brain Aging and Cognitive Decline  
Department of Neurology  
University of Pittsburgh School of Medicine; November 8, 1995.

Estrogen and Cholinergic Function: Implications for the Treatment of Alzheimer's Disease  
Department of Endocrinology  
University of Pittsburgh School of Medicine, October 2, 1996.

Effects of Estrogen on Brain Cholinergic Neurons and Growth Factors: Implications for  
Estrogen Replacement Therapy in Postmenopausal Women  
Department of Cell Biology & Physiology  
University of Pittsburgh School of Medicine  
Pittsburgh, PA; October 28, 1998.

Effects of Estrogen on Brain Function and Behavior: Implications for Estrogen Replacement  
Therapy in Postmenopausal Women  
Department of Endocrinology  
Magee-Womens Research Institute  
Pittsburgh, PA; May 4, 1999.

Effects of estrogen and progesterone on brain function and cognition: Implications for  
hormone replacement therapy in postmenopausal women  
Center for Reproductive Physiology  
University of Pittsburgh School of Medicine  
Pittsburgh, PA; December 20, 1999.

Estrogen and Cognition: Applying Basic Science to a Clinical Perspective  
Department of Endocrinology  
Magee-Womens Research Institute  
Pittsburgh, PA; Nov. 2003.

Research and the Guiding Hypothesis  
Clinical Research Seminar Series  
University of Pittsburgh School of Medicine  
Pittsburgh, PA; November 8, 2005.

Research and the Guiding Hypothesis  
Department of Endocrinology  
University of Pittsburgh School of Medicine  
Special lecture  
Pittsburgh, PA; November 22, 2005.

**INVITED LECTURES**, within University of Pittsburgh

Basic Mechanisms in Clinical Research  
University of Pittsburgh School of Dentistry  
Pittsburgh, PA; December 13, 2005.

Hypotheses and Specific Aims  
Clinical Research Seminar Series  
University of Pittsburgh School of Medicine  
Pittsburgh, PA; January 22, 2007.

## RESEARCH INTERESTS

My research focuses on mechanisms that contribute to brain aging and cognitive decline. Studies have focused primarily on the effects of ovariectomy and estrogen replacement on the functional status of specific neural systems in the aging brain, particularly basal forebrain cholinergic neurons, neurotrophins, and neurotrophin receptors. Behavioral tests are used to correlate effects on neural systems with changes in learning, memory and attentional processes. The goal of these studies is to understand the different mechanisms by which estrogenic therapies can help to reduce the risk and severity of age-related cognitive decline in women, and to identify hormone treatment strategies that are likely to be effective in the prevention and treatment of cognitive impairment associated with neurodegenerative diseases such as Alzheimer's disease and Parkinson's disease.

## PUBLICATIONS

### PEER REVIEWED ARTICLES

Students\* under my direction are indicated by an asterisk.

1. Cotman, C.W., M. Nieto-Sampedro, and R.B. Gibbs. Enhancing the self-repairing potential of the CNS after injury. Central Nervous System Trauma, 1984; 1(1): 3-14.
2. Gibbs, R.B., E.W. Harris, and C.W. Cotman. Replacement of damaged cortical projections by homotypic transplants of entorhinal cortex. J. Comp. Neurol., 1985; 237: 47-64.
3. Thompson, R., R.B. Gibbs, G.A. Ristic, C.W. Cotman, and J. Yu. Learning deficits in rats with early neurotoxic lesions to the globus pallidus, substantia nigra, median raphe, or pontine reticular formation. Physiol. Behav., 1986; 37: 141-151.
4. Thompson, R., R.B. Gibbs, G.A. Ristic, C.W. Cotman, and J. Yu. Lack of correlation between cortical levels of choline acetyltransferase and learning scores in rats with globus pallidus lesions. Brain Research, 1986; 367: 402-404.
5. Anderson, K.J., R.B. Gibbs, P.M. Salvaterra, and C.W. Cotman. Ultrastructural characterization of identified cholinergic neurons transplanted to the hippocampal formation of the rat. J. Comp. Neurol., 1986; 249: 279-292.
6. Gibbs, R.B., S.K.R. Pixley, and C.W. Cotman. Transplantation of septal neurons maintained in long-term culture. Brain Research, 1986, 382: 409-415.
7. Gibbs, R.B., K.J. Anderson, and C.W. Cotman. Factors affecting innervation in the CNS: Comparison of three cholinergic cell types transplanted to the hippocampus of adult rats. Brain Research, 1986; 383: 362-366.
8. Gibbs, R.B. and C.W. Cotman. Factors affecting survival and outgrowth from transplants of entorhinal cortex. Neuroscience, 1987; 21(3): 699-706.

**PEER REVIEWED ARTICLES (Continued)**

9. Gibbs, R.B., D.L. Needels, J. Yu, and C.W. Cotman. Effects of entorhinal lesions on trophic activities present in rat entorhinal cortex and hippocampus as studied using primary cultures of entorhinal and septal tissues. J. Neurosci. Res., 1987; 18: 274-288.
10. Gibbs, R.B., J. Yu, and C.W. Cotman. Entorhinal transplants and spatial memory abilities in rats. Behav. Brain Res., 1987; 26: 29-35.
11. Anderson, K.J., R.B. Gibbs, and C.W. Cotman. Transmitter phenotype is a major determinant in the specificity of synapses formed by cholinergic neurons transplanted to the hippocampus. Neuroscience, 1988; 25: 19-25.
12. Joyce, J.N., R.B. Gibbs, C.W. Cotman, and J.F. Marshall. Regulation of acetylcholine muscarinic receptors by embryonic septal grafts showing cholinergic innervation of host hippocampus. Prog. in Brain Res., 1989; 78: 109-115.
13. Joyce, J.N., R.B. Gibbs, C.W. Cotman, and J.F. Marshall. Regulation of muscarinic receptors in hippocampus following cholinergic denervation and reinnervation by septal and striatal transplants. J. Neurosci., 1989; 9: 2776-2791.
14. Gibbs, R.B., J.T. McCabe, C.R. Buck, M.V. Chao, and D.W. Pfaff. Expression of NGF receptor in the rat forebrain detected with *in situ* hybridization and immunohistochemistry. Molec. Brain Res., 1989; 6: 275-287.
15. Russell, M.J., V.K. Vijayan, R.B. Gibbs, J.W. Geddes, C.H. Jacobson, and C.W. Cotman. Long-term survival of neural transplants to senescence in rats. Exp. Neurol., 1990; 108: 105-108.
16. Gibbs, R.B., C.V. Mobbs, and D.W. Pfaff. Sex steroids and Fos expression in the rat brain and uterus. Molec. and Cell. Neurosci., 1990; 1: 29-40.
17. Gibbs, R.B. A. Lombardino, and D.W. Pfaff. Sex steroids and Fos expression in the CNS of prepubertal and newborn rats. Molec. and Cell. Neurosci., 1990; 1: 250-261.
18. Gibbs, R.B., M.V. Chao, and D.W. Pfaff. Effects of fimbria/fornix and angular bundle transection on expression of the p75<sup>NGFR</sup> mRNA by cells in the medial septum and diagonal band of Broca: Correlations with cell survival, synaptic reorganization and sprouting. Molec. Brain Res., 1991; 11: 207-219.
19. Koibuchi, N.\*, R.B. Gibbs, M. Suzuki, and D.W. Pfaff. Thyroidectomy induces Fos expression by TRH-containing neurons located in the adult rat hypothalamus. Endocrinology, 1991; 129(6): 3208-3216.
20. Chastrette, N.\*, D.W. Pfaff, and R.B. Gibbs. Effects of daytime and nighttime stress on Fos-like immunoreactivity in the paraventricular nucleus of the hypothalamus and other brain regions. Brain Research, 1991; 563: 339-344.

**PEER REVIEWED ARTICLES (Continued)**

21. Gibbs, R.B. and D.W. Pfaff. Effects of estrogen and fimbria/fornix transection on p75<sup>NGFR</sup> and ChAT expression in the medial septum and diagonal band of Broca. Exp. Neurology, 1992; 16: 23-39.
22. Okano, H.J.\*, D.W. Pfaff, and R.B. Gibbs. Role of local environmental factors in determining tissue-specific effects of estrogen: Examination of uterine tissues transplanted to brain. Molec. & Cell. Endocrinol., 1992; 87: 179-192.
23. Gibbs, R.B., M.M. McCarthy, D.W. Pfaff. Nerve growth factor affects defense-related behaviors, but not lordosis, in ovariectomized, estrogen-treated rats. Brain Research, 1993; 610: 256-266.
24. Okano, H.J.\*, D.W. Pfaff, and R.B. Gibbs. RB and cdc2 expression in brain: Correlations with <sup>3</sup>H-thymidine incorporation. J. Neurosci., 1993; 13(7): 2930-2938.
25. Pfaus, J.G., S.P. Kleopoulos, C.V. Mobbs, R.B. Gibbs, and D.W. Pfaff. Fos and Jun expression in the female rat forebrain following hormone treatment and sexual stimulation. Brain Research, 1993; 624: 253-267.
26. Koibuchi, N.\*, R.B. Gibbs, K.E. Jones, S. Yamaoka, W.W. Chin, D.W. Pfaff, and M. Suzuki. Increase in c-erbA $\alpha$ 2 mRNA in the parvocellular region of the paraventricular nucleus of the hypothalamus following thyroidectomy detected by quantitative *in situ* hybridization histochemistry in the adult male rat. Neurosci. Lett., 1993; 164: 159-162.
27. Gibbs, R.B. and D.W. Pfaff. In situ hybridization detection of trkA mRNA in brain: Distribution, co-localization with p75<sup>NGFR</sup> and up-regulation by nerve growth factor. J. Comp. Neurol., 1993; 341: 324-339.
28. Gibbs, R.B., D-H. Wu, L. Hersh, and D.W. Pfaff. Effects of estrogen replacement on relative levels of ChAT, TrkA and nerve growth factor messenger RNAs in the basal forebrain and hippocampal formation of adult rats. Exp. Neurol., 1994; 129: 70-80.
29. Pfaus, J.G., A. Jakob, S.P. Kleopoulos, R.B. Gibbs, and D.W. Pfaff. Sexual stimulation induces Fos immunoreactivity within GnRH neurons of the female rat preoptic area: interaction with steroid hormones. Neuroendocrinol., 1994; 60: 283-290.
30. Gibbs, R.B. Fluctuations in Relative Levels of Choline Acetyltransferase mRNA in Different Regions of the Rat Basal Forebrain Across the Estrous Cycle: Effects of Estrogen and Progesterone, J. Neurosci., 1996; 16(3): 1049-1055.
31. Okano, H.J.\*, Pfaff, D.W., and Gibbs, R.B. Expression of EGFR-, p75<sup>NGFR</sup>-, and PSTAIR (cdc2)-like Immunoreactivity by Proliferating Cells in the Adult Rat Hippocampal Formation and Forebrain, Dev. Neurosci., 1996; 15: 199-209.

**PEER REVIEWED ARTICLES (Continued)**

32. Gibbs, R.B. Expression of estrogen receptor-like immunoreactivity by different subgroups of basal forebrain cholinergic neurons in gonadectomized male and female rats, Brain Research, 1997; 720: 61-68.
33. Gibbs, R.B., Hashash, A.\*, and Johnson, D.A. Effects of estrogen on potassium-evoked acetylcholine release in the hippocampus and overlying cortex of adult rats, Brain Research, 1997; 749: 143-146.
34. Gibbs, R.B. and Martynowski, C.\* Nerve growth factor induces Fos-like immunoreactivity within identified cholinergic neurons in the adult rat basal forebrain, Brain Research, 1997; 753: 141-151.
35. Gibbs, R.B. Effects of estrogen on basal forebrain cholinergic neurons vary as a function of dose and duration of treatment, Brain Research, 1997; 757: 10-16.
36. McCarthy, M.M., Besmer, H.R., Jacobs, S.C., Keidan, G.M.O.\*, and Gibbs, R.B. Influence of maternal grooming, sex and age on Fos immunoreactivity in the preoptic area of neonatal rats: implications for sexual differentiation, Dev. Neurosci., 1997; 19: 488-496.
37. Gibbs, R.B. Impairment of basal forebrain cholinergic neurons associated with aging and long-term hormone deprivation in rats, Exp. Neurol., 1998; 151: 289-302.
38. Gibbs, R.B. Changes in relative levels of trkA and BDNF mRNA, but not NGF mRNA, across the estrous cycle and in response to acute hormone replacement, Brain Research, 1998; 787:259-268.
39. Gibbs, R.B., Aggarwal, P.\* Estrogen and basal forebrain cholinergic neurons: Implications for brain aging and Alzheimer's disease-related cognitive decline. Hormones & Behavior, 1998; 34: 98-111.
40. Gibbs, R.B., Burke, A.M.\*, and Johnson, D.A. Estrogen replacement attenuates effects of scopolamine and lorazepam on memory acquisition and retention, Hormones & Behavior, 1998; 34: 112-125.
41. Gibbs, R.B., Treatment with estrogen and progesterone affects relative levels of brain-derived neurotrophic factor mRNA and protein in different regions of the adult rat brain. Brain Research, 1999; 844(1-2): 20-27.
42. Gibbs, R.B., Estrogen replacement enhances acquisition of a spatial memory task and reduces deficits associated with hippocampal muscarinic receptor inhibition. Hormones & Behavior, 1999; 36: 222-233.
43. Gibbs, R.B., Long-term treatment with estrogen and progesterone enhances acquisition of a spatial memory task by ovariectomized aged rats. Neurobiol. of Aging, 2000; 21: 107-116.

**PEER REVIEWED ARTICLES (Continued)**

44. Aggarwal, P.\* and Gibbs, R.B., Estrogen replacement does not prevent the loss of choline acetyltransferase positive cells in the basal forebrain following either neurochemical or mechanical lesions. Brain Research, 2000; 882: 75-85.
45. Gibbs, R.B., Effects of Gonadal Hormone Replacement on Measures of Basal Forebrain Cholinergic Function. Neuroscience, 2000, 101(4): 931-938.
46. Gibbs, R.B., Nelson, D., Anthony, M.S., and Clarkson, T.B. (2002) Effects of long-term hormone replacement and of tibolone on choline acetyltransferase and acetylcholinesterase activities in the brains of ovariectomized, cynomolgous monkeys. Neuroscience, 2002, 113(4): 907-914.
47. Johnson, D.A., Zambon, N.J., and Gibbs, R.B. (2002) Selective lesions of cholinergic neurons in the medial septum by 192 IgG-Saporin impairs learning of a delayed matching to position T-maze paradigm. Brain Research, 943: 132-141.
48. Gibbs, R.B. (2002) Basal forebrain cholinergic neurons are necessary for estrogen to enhance acquisition of a delayed matching to position T-maze task. Horm. & Behav., 42: 245-257.
49. Gabor, R.\*, Nagle, R., Johnson, D.A., and Gibbs, R.B. (2002) Estrogen enhances potassium-stimulated acetylcholine release in the rat hippocampus. Brain Research, 962: 244-247.
50. Gibbs, R.B. (2003) Effects of aging and long-term hormone replacement on cholinergic neurons in the medial septum and nucleus basalis magnocellularis of ovariectomized rats. J. Neuroendocrinol., 15: 477-485.
51. Rudick, C.N., Gibbs, R.B., and Woolley, C.S. (2003) A role for the basal forebrain cholinergic system in estrogen-induced disinhibition of hippocampal pyramidal cells. J. Neurosci., 23(11): 4479-4490.
52. Gibbs, R.B., Gabor, R.\* (2003) Estrogen and Cognition: Applying Preclinical findings to Clinical Perspectives. J. Neurosci. Res., 74: 637-643.
53. Pongrac, J.L., Gibbs, R.B., DeFranco, D.B. (2004) Estrogen-mediated differential regulation of cholinergic expression in basal forebrain neurons requires kinase activity. Neurosci., 124: 809-816.
54. Gibbs, R.B., Gabor, R.\*, Cox, T., Johnson, D.A. (2004) Raloxifene enhances cholinergic function, but not learning, in ovariectomized rats. Psychoneuroendocrinol., 29: 741-748.
55. Thomas, K., Sung, D-Y, Yang, J, Johnson, K., Thompson, W., Millette, C., McCarrey, J., Breitberg, A., Gibbs, R.B., Walker, W. (2005) Identification, characterization and functional analysis of Sp1 transcript variants expressed in germ cells during mouse spermatogenesis. Biol. of Reprod., 72: 898-907.

**PEER REVIEWED ARTICLES (Continued)**

56. Gibbs, R.B. (2005) Testosterone and Estradiol Produce Different Effects on Cognitive Performance in Male Rats. Horm. & Behav., 48: 268-277. PMC2376813.
57. Poloyac, S.M., Rohan, L.C., Janjic, J.M., Gibbs, R.B., Kroboth, P.D.K., Smith, R.B. (2005) GEAR-UP (Graduate Education And Research at the University of Pittsburgh): A Program to Educate Students about Pharmaceutical Research. American Journal of Pharmaceutical Education 69(5): 1-7.
58. Fitz, N, Gibbs, R.B., and Johnson, D. (2006) Aversive stimulus attenuates impairment of acquisition in a delayed match to position T-maze task caused by a selective lesion of septohippocampal cholinergic projections. Brain Research Bulletin 69:660-665. PMC2366805.
59. Gibbs, R.B., Edwards, D., Lazar, N.\*, Nelson, D., Talameh, J.\* (2006) Effects of long-term hormone treatment and or tibolone on monoamines and monoamine metabolites in the brains of ovariectomized, Cynomologous monkeys. J. Neuroendocrinol. 18: 643-654.
60. Lu, C., Walker, W.H., Sun, J., Weisz, O.A., Gibbs, R.B., Witchel, S.F., Sperling, M.A., and Menon, R.K. (2006) Insulin-like peptide 6 (Insl6): Characterization of secretory status and post-translational modification. Endocrinol. 147(12): 5611-5623.
61. Gibbs, R.B. and Johnson, D.A. (2007) Cholinergic lesions produce task-selective effects on delayed matching to position and configural association learning related to response pattern and strategy. Neurobiol. Learning and Memory, 88: 19-32. PMC1991294.
62. Gibbs, R.B. (2007) Estradiol enhances DMP acquisition via a mechanism not mediated by turning strategy, but which requires basal forebrain cholinergic projections. Horm. & Behav., 52: 352-359. NIHMS 30086.
63. Gibbs, R.B. and Johnson, D.A. (2008) Sex specific effects of gonadectomy and hormone treatment on acquisition of a 12-arm radial maze task by Sprague-Dawley rats. Endocrinology, 149(6): 3176-3183, PMC2408814.
64. Ramaswamy, S., Guerriero, K.A., Gibbs, R.B., Plant, T.M. (2008) Interactions between kisspeptin and GnRH Neurons in the mediobasal hypothalamus of the male rhesus monkey (*Macaca mulatta*) as revealed by double immunofluorescence and confocal microscopy. Endocrinology, 149 (9): 4387-95.
65. Fitz, N., Gibbs, R.B., and Johnson, D. (2008) Selective Lesions of Septal Cholinergic Neurons in Rats Impairs Acquisition of a Delayed Matching to Position T-maze Task by Delaying the Shift from a Response to a Place Strategy, Brain Res. Bull., 77: 356-360.
66. Gibbs, R.B., Mauk, R., Nelson, D., Johnson, D.A. (2009) Donepezil treatment restores the ability of estradiol to enhance cognitive performance in aged rats: Evidence for the cholinergic basis of the critical period hypothesis. Horm. & Behav., 56: 73-83. NIHMS123055, Publ.ID: YHBEH2819

67. Hammond, R., Mauk, R., Ninaci, D., Nelson, D., and Gibbs, R.B. (2009) Chronic treatment with estrogen receptor agonists restores acquisition of a spatial memory task in young ovariectomized rats. *Horm. & Behav.*, 56: 309-314.
68. Ramaswamy, Gibbs, R.B., Plant, T.M. (2009) Studies of the localization and action of kisspeptin within the pituitary of the rhesus monkey (*Macaca mulatta*), *Journal of Neuroendocrinology*, Submitted.

## INVITED PAPERS AND BOOK CHAPTERS

1. Cotman, C.W. and R.B. Gibbs. (1984) Methods for transplanting CNS tissues to the CNS of adult and developing mammals. In: Plasticity in Neurobiology: Cell to Behavior, Society for Neurosciences Short Course I Syllabus, 16-29.
2. Cotman, C.W., R.B. Gibbs, and M. Nieto-Sampedro. (1987) Synapse turnover in the mammalian CNS. In: The Dahlem Workshop Report: Neural and Molecular mechanisms of Learning, Springer-Verlag, Berlin, 375-396.
3. Nieto-Sampedro, M., P. Kesslak, R.B. Gibbs, and C.W. Cotman. (1987) Effects of conditioning lesions on transplant survival and connectivity. In: Cell and Tissue Transplantation into the Adult Brain. Annal. N.Y. Acad. Sci., 495: 108-119.
4. Gibbs, R.B. (1994) Estrogen and nerve growth factor-related systems in brain: effects on basal forebrain cholinergic neurons and implications for learning and memory processes and aging, In: Hormonal Restructuring of the Adult Brain: Basic and Clinical Perspectives, ed. V. H. Luine, Annal. N.Y. Acad. Sci., 743:165-199.
5. Gibbs, R.B. (2000) Effects of estrogen on basal forebrain cholinergic neurons and cognition: implications for brain aging and dementia in women, In: Hormones and Aging and Mental Disorders, ed. M. Morrison, Cambridge University Press, 183-222.
6. Gibbs, R.B. (2000) Oestrogen and the cholinergic hypothesis: implications for estrogen replacement therapy in postmenopausal women, In: Neuronal and Cognitive Effects of Oestrogens (Novartis Found. Symp. 230), J. Goode, Ed., Wiley, Chichester, 94-106.
7. Gibbs, R.B., (2002) Potential mechanisms for the effects of estrogen on cognitive processes: role of basal forebrain cholinergic projections, In: Neuroplasticity, Development, and Steroid Action, Handa, Hayashi, Terasawa, Kawata, Eds., CRC Press, Boca Raton, FL, 117-129.
8. Gibbs, R.B., (2006) Preclinical data relating to estrogen's effects on cognitive performance, In: Estrogen's Effects on Brain Function: What's Next, N. Rasgon, Ed. Johns Hopkins Press, Baltimore, MD, 9-45.
9. Gibbs, R.B. (2009) Animal Studies that Support Estrogen Effects on Cognitive Performance and the Cholinergic Basis of the Critical Period Hypothesis, In: Hormones, Cognition and Dementia: State of the Art and Emergent Therapeutic Strategies, E. Hogervorst, V. Henderson, R.B. Gibbs, and R. Brinton, Eds., Cambridge University Press, Cambridge, UK., In Press.

## ABSTRACTS AND SCIENTIFIC PRESENTATIONS AT MEETINGS

Students\* under my direction are indicated by an asterisk.

Gibbs, R.B., E.W. Harris, and C.W. Cotman

Replacement of damaged cortical projections by homotypic transplants of entorhinal cortex.  
Annual Meeting of the Society for Neuroscience, Anaheim, CA; November, 1984  
Published: Soc. For Neurosci. Abstr. 1984; 10:1035.

Paul, L.A., R.B. Gibbs, L. Braun, W.H. Oldendorf, and C.W. Cotman

Vascular patterns in intact rat brain and in brains which contain implants of fetal tissue:  
Studies using microangiography and ink injection.  
Annual Meeting of the Society for Neuroscience, Anaheim, CA; November, 1984  
Published: Soc. For Neurosci. Abstr. 1984; 10:1027.

Gibbs, R.B., S.K.R. Pixley, and C.W. Cotman

Transplants of septal neurons from long-term cultures  
Annual Meeting of the Society for Neuroscience, Dallas, CA; November, 1985  
Published: Soc. For Neurosci. Abstr. 1985; 11:391.

Anderson, K.J., R.B. Gibbs, P.M. Salvaterra, and C.W. Cotman

Immunohistochemical localization of choline acetyltransferase in septal neurons transplanted  
to the rat hippocampus.  
Annual Meeting of the Society for Neuroscience, Dallas, CA; November, 1985  
Published: Soc. For Neurosci. Abstr. 1985; 11:1125.

Cotman, C.W. and R.B. Gibbs

Growth promoting factors in relationship to transplantation.  
Conference on Neural Grafts and Potential Therapeutic Approaches to Neurological Disease  
Cedar-Sinai Medical Center; March 21-22.

Anderson, K.J., R.B. Gibbs, and C.W. Cotman

Habenular transplants to the hippocampal formation of the rat.  
Published: Anat. Rec. 1986; 214: 5A.

Gibbs, R.B. and C.W. Cotman

Factors affecting survival and outgrowth from transplants of entorhinal cortex.  
Annual Meeting of the Society for Neuroscience, Washington, D.C.; November, 1986  
Published: Soc. For Neurosci. Abstr. 1986; 12:975.

Joyce, J.N., R.B. Gibbs, C.W. Cotman, and J.F. Marshall

Regulation of acetylcholine M1 receptors by embryonic septal grafts showing cholinergic  
innervation of host hippocampus.  
Schmitt Neurological Sciences Symposium, 1987.

Gibbs, R.B., J.T. McCabe, C.R. Buck, M.V. Chao, and D.W. Pfaff

Localization of NGF receptor mRNA in rat brain using *in situ* hybridization.  
Annual Meeting of the Society for Neuroscience, Toronto, CA; November, 1988  
Published: Soc. For Neurosci. Abstr. 1988; 14:824.

**ABSTRACTS AND SCIENTIFIC PRESENTATIONS (Continued)**

Gibbs, R.B., C.V. Mobbs, and D.W. Pfaff

Sex steroids and fos expression in the rat brain and uterus.

Annual Meeting of the Society for Neuroscience, Phoenix, AZ; November, 1989

Published: Soc. For Neurosci. Abstr. 1989; 15:334.

Gibbs, R.B., and D.W. Pfaff

In situ hybridization for new insights on hormone-related and growth phenomena in neurons.

Presented at the 16th Annual Meeting of the Japanese Neuroendocrine Society, 10/20/89-10/22/89, Hokkaido University, Hokkaido, Japan.

Published: Folia Endocrinologica Japonica 1989; 65:9.

Zheng, L.-M., M. Schwanzel-Fukuda, J.F. Hejtmancik, R.B. Gibbs, and D.W. Pfaff

Properties of neuroendocrine cells migrating from olfactory placode into basal forebrain.

Annual Meeting of the Society for Neuroscience, St. Louis, MO; November, 1990

Published: Soc. For Neurosci. Abstr. 1990; 16:953.

Koibuchi, N.\* , R.B. Gibbs, M. Suzuki, and D.W. Pfaff

Thyroidectomy induces fos-like immunoreactivity in the parvocellular paraventricular hypothalamic nucleus of the rat.

Annual Meeting of the Society for Neuroscience, St. Louis, MO; November, 1990

Published: Soc. For Neurosci. Abstr. 1990; 16:95.

Gibbs, R.B. and D.W. Pfaff

Effects of estrogen and fimbria/fornix transection on NGF receptor immunoreactivity in the rat basal forebrain.

Annual Meeting of the Society for Neuroscience, St. Louis, MO; November, 1990

Published: Soc. For Neurosci. Abstr. 1990; 16:819.

Gibbs, R.B., M.V. Chao, and D.W. Pfaff

Effects of fimbria-fornix and angular bundle transection on NGFR mRNA-expressing cells located in the medial septum and diagonal band of Broca.

Annual Meeting of the Society for Neuroscience, New Orleans, LA; November, 1991

Published: Soc. For Neurosci. Abstr. 1991; 17:20.

Okano, H.J.\* , R.B. Gibbs, and D.W. Pfaff

Effects of estrogen on Fos-like immunoreactivity (F-IR) and <sup>3</sup>H-thymidine (<sup>3</sup>H-Thy) incorporation within uterine tissues transplanted to the adult rat CNS.

Annual Meeting of the Society for Neuroscience, New Orleans, LA; November, 1991

Published: Soc. For Neurosci. Abstr. 1991; 17:435.

Yu, W.H.A., R.B. Gibbs, and D.W. Pfaff

Effects of testosterone on levels of ribosomal RNA (rRNA) in hypoglossal neurons following nerve injury.

Annual Meeting of the Society for Neuroscience, New Orleans, LA; November, 1991

Published: Soc. For Neurosci. Abstr. 1991; 17:226.

**ABSTRACTS AND SCIENTIFIC PRESENTATIONS (Continued)**

- Pfaus, J.G., S.P. Kleopoulos, C.V. Mobbs, R.B. Gibbs, and D.W. Pfaff  
Fos and Jun expression in the female rat forebrain following hormone treatment and sexual stimulation.  
Annual Meeting of the Society for Neuroscience, Anaheim, CA; October, 1992  
Published: Soc. For Neurosci. Abstr. 1992; 18:892.
- Okano, H.J.\*, D.W. Pfaff, and R.B. Gibbs  
Expression of Rb, cdc2, NSE, and Fos by neuronal precursor cells in the adult brain.  
Annual Meeting of the Society for Neuroscience, Anaheim, CA; October, 1992  
Published: Soc. For Neurosci. Abstr. 1992; 18:623.
- Gibbs, R.B., M. M. McCarthy, and D.W. Pfaff  
Effects of NGF and anti-NGF on weight gain and female sexual behaviors in the rat.  
Annual Meeting of the Society for Neuroscience, Anaheim, CA; October, 1992  
Published: Soc. For Neurosci. Abstr. 1992; 18:1099.
- Holtzman, D.A., H.J. Okano\*, M. Schwanzel-Fukuda, D.W. Pfaff, and R.B. Gibbs  
Lack of correlation between nuclear cdc2-like immunoreactivity and 3H-thymidine incorporation in vertebrate cells dividing *in vivo*.  
Penn State Univ: Summer Symposium in Molecular Biology, University Park, PA; July 1992.
- Pfaus, J.G., S.P. Kleopoulos, A.L. Jakob, R.B. Gibbs, and D.W. Pfaff  
Sexual stimulation induces fos within GnRH-containing neurons of the female rat preoptic area.  
Annual Meeting of the Society for Neuroscience, Washington, D.C.; November, 1993  
Published: Soc. For Neurosci. Abstr. 1993; 19.
- Okano, H.J.\*, D.W. Pfaff, and R.B. Gibbs  
Immunocytochemical and autoradiographic characterization of neuronal stem cells in the adult rat brain.  
Annual Meeting of the Society for Neuroscience, Washington, D.C.; November, 1993  
Published: Soc. For Neurosci. Abstr. 1993; 19.
- Gibbs, R.B., D-H. Wu, and D.W. Pfaff  
Effects of estrogen on relative levels of ChAT, TrkA and NGF mRNAs in the rat forebrain and hippocampal formation.  
Annual Meeting of the Society for Neuroscience, Washington, D.C.; November, 1993  
Published: Soc. For Neurosci. Abstr. 1993; 19.
- Pfaus, J., L. Green, S. Kleopoulos, R.B. Gibbs, and D.W. Pfaff, (1993)  
Fos induction in the female rat forebrain following hormone treatment and sexual stimulation. Presented at the International Conference on Hormones, Brain, and Behavior held in Tours, France; August 1993.

**ABSTRACTS AND SCIENTIFIC PRESENTATIONS (Continued)**

Okano, H.J.\* , Yu, W-h. A., and Gibbs, R.B.

Changes in retinoblastoma susceptibility protein (RB)- and c-Jun-like immunoreactivity (IR) in hypoglossal neurons following hypoglossal nerve crush.

Annual Meeting of the Society for Neuroscience, Miami Beach, FL; November, 1994

Published: Soc. For Neurosci. Abstr. 1994; 20:1498.

Gibbs, R.B.

Changes in the expression of choline acetyltransferase (CHAT) mRNA across the estrus cycle: Effects of estrogen and progesterone.

Annual Meeting of the Society for Neuroscience, San Diego, CA; November, 1995

Published: Soc. For Neurosci. Abstr. 1995; 21:553.

Besmer, H.R., Keidan, G.M.O.\* , Gibbs, R.B., and McCarthy, M.M.

Implications of Fos immunoreactivity in the preoptic area of neonatal rats,

Annual Meeting of the Society for Neuroscience, Washington, D.C.; November, 1996

Published: Soc. For Neurosci. Abstr. 1996; 22.

Gibbs, R.B.

Effects of estrogen on basal forebrain cholinergic neurons vary as a function of dose and duration of treatment

Annual Meeting of the Society for Neuroscience, Washington, D.C.; November, 1996

Published: Soc. For Neurosci. Abstr. 1996; 22.

Gibbs, R.B., Burke, A.M.\* , and Johnson, D.A.

Effects of estrogen replacement on lorazepam- and scopolamine-induced impairments in passive avoidance memory.

Annual Meeting of the Society for Behavioral Neuroendocrinology, Baltimore, MD; May, 1997

Gibbs, R.B.

Effects of aging, gender, and hormone deprivation on basal forebrain cholinergic neurons in rats.

Annual Meeting of the Society for Neuroscience, New Orleans, LA; October, 1997

Published: Soc. For Neurosci. Abstr. 1997; 23.

Burke, A.M.\* , Johnson, D.A., and Gibbs, R.B.

Estrogen attenuates specific learning and memory deficits induced by scopolamine and lorazepam.

Annual Meeting of the Society for Neuroscience, Los Angeles, CA; November, 1998

Published: Soc. For Neurosci. Abstr. 1998; 24.

Gibbs, R.B.

Estrogen enhances learning of a spatial memory task.

Annual Meeting of the Society for Neuroscience, Los Angeles, CA; November, 1998

Published: Soc. For Neurosci. Abstr. 1998; 24.

**ABSTRACTS AND SCIENTIFIC PRESENTATIONS (Continued)**

Gibbs, R.B.

Effects of Estrogen and Progesterone on the Levels of BDNF mRNA and Protein in Different Regions of the Rat Brain.

Annual Meeting of the Society for Neuroscience, Miami Beach, FL; October, 1999

Published: Soc. For Neurosci. Abstr. 1999; 25.

Aggarwal, P.\* and Gibbs, R.B.

Estrogen does not attenuate the loss of ChAT-positive neurons in the basal forebrain produced by neurochemical lesions or fimbria transection.

Annual Meeting of the Society for Neuroscience, Miami Beach, FL; October, 1999

Published: Soc. For Neurosci. Abstr. 1999; 25.

Pongrac, J.L. and Gibbs, R.B.

NGF-mediated enhancement of the cholinergic phenotype in rat basal forebrain neurons is reduced by estrogen.

2000 Neuroendocrine Workshop on Estrogen, Growth Factors and Neuroplasticity

Sponsored by the Americal Neuroendocrine Society

Toronto, ON, CA; June 2000

Gibbs, R.B.

Effects of different doses and regimens of gonadal hormone replacement on measures of basal forebrain cholinergic function.

Annual Meeting of the Society for Neuroscience, New Orleans, LA; November, 2000

Published: Soc. For Neurosci. Abstr. 2000; 26.

Mantella, R.C.\* and Gibbs, R.B. Long-term hormone replacement does not effect the number of ChAT-positive neurons in the basal forebrain of aged rats.

Annual Meeting of the Society for Neuroscience, New Orleans, LA; November, 2000

Published: Soc. For Neurosci. Abstr. 2000; 26.

Johnson, D.J., Zambon, N.J., and Gibbs, R.B.

Selective destruction of basal forebrain cholinergic neurons impairs acquisition of a spatial memory task.

Annual Meeting of the Society for Neuroscience, New Orleans, LA; November, 2000

Published: Soc. For Neurosci. Abstr. 2000; 26.

Gibbs, R.B.

Estrogen enhancement of learning requires intact basal forebrain cholinergic neurons.

Annual Meeting of the Society for Neuroscience, San Diego, CA; November, 2001

Soc. For Neurosci. Abstr. 2001; 27., Program Number 312.12.

Zambon, N.J., Nagle, R., Pokala, V., Gibbs, R.B., Johnson, D.J.

Low-dose 192IgG saporin selectively destroys basal forebrain cholinergic neurons and impairs acquisition of a spatial memory task.

Annual Meeting of the Society for Neuroscience, San Diego, CA; November, 2001

Soc. For Neurosci. Abstr. 2001; 27., Program Number 534.13.

**ABSTRACTS AND SCIENTIFIC PRESENTATIONS (Continued)**

- Pongrac, J.L., Gibbs, R.B., and DeFranco, D.B.  
Estrogen augments cholinergic function when administered directly to primary cultures of rat basal forebrain  
Annual Meeting of the Society for Neuroscience, San Diego, CA; November, 2001  
Soc. For Neurosci. Abstr. 2001; 27, Program Number 549.7.
- Gibbs, R.B., Nagel, S.C., Miranda, P.H., and McDonnell, D.P.  
GnRH neurons and cholinergic neurons in the mouse basal forebrain contain estrogen receptor transcriptional activity.  
Annual Meeting of the Society for Neuroscience, Orlando, FL; November, 2002  
Soc. For Neurosci. Viewer/Itinerary Planner 2002, Program Number 574.1.
- Butt, A.E., Hamilton, D.A., Duerkop, M.S., King, D.D., Gibbs, R.B., and Sutherland, R. Spatial memory impairments in rats with 192 IgG-saporin lesions of the nucleus basalis magnocellularis.  
Annual Meeting of the Society for Neuroscience, Orlando, FL; November, 2002  
Soc. For Neurosci. Viewer/Itinerary Planner 2002, Program Number 378.5.
- Rudick, C.N., Gibbs, R.B., and Woolley, C.S..  
Estrogen-induced disinhibition of CA1 pyramidal cells depends on basal forebrain cholinergic neurons  
Annual Meeting of the Society for Neuroscience, Orlando, FL; November, 2002  
Soc. For Neurosci. Viewer/Itinerary Planner 2002, Program Number 740.6.
- Gibbs, R.B.  
Estrogen, cholinergic function, and cognition  
85<sup>th</sup> annual meeting of The Endocrine Society, Philadelphia, PA; June 19, 2003
- Lazar, N, Edwards, D., Gibbs, R.B.  
Effects of Tibolone vs Standard Hormone Replacement Therapy on Monoamines and Monoamine Metabolites in the Brains of Cynomologous Monkeys  
25<sup>th</sup> Annual Pharmacy Student Research Conference – Eastern States, Univ. Virginia, October 2003.
- Gibbs, R.B., Gabor, R., Cox, T., and Johnson, D.A.  
Effects of raloxifene and estradiol on hippocampal acetylcholinesterase release and spatial learning in the rat  
Annual Meeting of the Society for Neuroscience, New Orleans, LA; November, 2003  
Soc. For Neurosci. Viewer/Itinerary Planner 2003, Program Number 626.13.
- Ukairo, O.T., Arshad, S., Gibbs, R.B., and Johnson, D.A.  
Selective cholinergic lesion of the medial septum impairs retention but not acquisition of a passive avoidance memory task  
Annual Meeting of the Society for Neuroscience, New Orleans, LA; November, 2003  
Soc. For Neurosci. Viewer/Itinerary Planner 2003, Program Number 425.16.

**ABSTRACTS AND SCIENTIFIC PRESENTATIONS (Continued)**

Fitz, N.F., Gibbs, R.B., and Johnson, D.A.

Arousal enhances delayed match to position T-maze performance independent of septo-hippocampal cholinergic projections

Annual Meeting of the Society for Neuroscience, New Orleans, LA; November, 2003  
Soc. For Neurosci. Viewer/Itinerary Planner 2003, Program Number 425.17.

Lu, C., Singh, S., Menon, R., Gibbs, R.B., Walker, W., and Menon, R.K.

The signal peptide of insulin-like factor 6 (Insl6) directs Insl6 into the ER but not for secretion

86<sup>th</sup> annual meeting of The Endocrine Society, New Orleans, LA; June 16, 2004

Thomas, K., Sung, D.Y., Chen, J., Johnson, K., Walker, W., and Gibbs, R.B.

Spatial and temporal patterns of expression SP1 transcription factor variants during spermatogenesis

86<sup>th</sup> annual meeting of The Endocrine Society, New Orleans, LA; June 16, 2004

Gibbs, R.B.

Estrogen, but not testosterone, enhances acquisition of a spatial memory task in male rats

Annual Meeting of the Society for Neuroscience, San Diego, CA; October, 2004

Soc. For Neurosci. Viewer/Itinerary Planner 2004, Program Number 777.2.

Shibata, M., Gibbs, R.B., Shahab, M., and Plant, T.M.

Further studies of kisspeptin/GPR54 signaling in the control of the onset of puberty in the rhesus monkey (*Macaca mulatta*)

6<sup>th</sup> Puberty Conference, Evian, France; May, 2005

Plant, T.M., Shibata, M., Gibbs, R.B., Shahab, M.

GnRH Neurons in the Peripubertal male rhesus monkey (*Macaca mulatta*) express GPR54: Implications for the control of primate puberty

87<sup>th</sup> annual meeting of The Endocrine Society, San Diego, CA; June, 2005

Gibbs, R.B., Fitz, N.F., and Johnson, D.A.

Cholinergic lesions produce selective effects on cognitive performance in rats

Annual Meeting of the Society for Neuroscience, Washington, DC; November, 2005

Soc. For Neurosci. Viewer/Itinerary Planner 2005, Program Number 881.1.

Gibbs, R.B.

Hormone therapy and cognition: What the animals are telling us

The Tenth Annual Graylyn Conference on Women's Cognitive Health

Winston-Salem, NC, October 26-28, 2005.

Gibbs, R.B.

Cholinergic Neurons, Hormone Therapy, and Age-Related Cognitive Decline: Preclinical Studies

The Fifth International Conference on Geriatric Psychoneuropharmacology

Pittsburgh, PA, November 2-5, 2005.

- Abitoye, P.A., Li, P., Gibbs, R.B. and Johnson, D.A.  
Steroid sulfatase inhibitor (p-o-sulfamoyl) - tetradecanoyl tyramine (du-14) enhances memory retention in rats with cholinergic lesion  
Annual Meeting of the Society for Neuroscience, Atlanta, GA; November, 2006  
Soc. For Neurosci. Viewer/Itinerary Planner 2006, Program Number 163.15.
- Fitz, N.F., Gibbs, R.B. and Johnson, D.A.  
The role of septo-hippocampal cholinergic lesion, place versus response strategy and acquisition of a delayed matching to position T-maze task  
Annual Meeting of the Society for Neuroscience, Atlanta, GA; November, 2006  
Soc. For Neurosci. Viewer/Itinerary Planner 2006, Program Number 751.20.
- Gibbs, R.B., Fitz, N.F., and Johnson, D.A.  
Task-selective effects of ovariectomy on learning - impaired acquisition of a 12-arm radial maze task  
Annual Meeting of the Society for Neuroscience, Atlanta, GA; November, 2006  
Soc. For Neurosci. Viewer/Itinerary Planner 2006, Program Number 80.28.
- Gibbs, R.B.  
Estradiol enhances DMP acquisition via a mechanism not mediated by turning strategy, but which requires intact basal forebrain cholinergic projections  
11<sup>th</sup> Annual Meeting of the Society for Behavioral Neuroendocrinology, Asilomar Conference Center, Pacific Grove, CA; June, 2007
- Ramaswamy, S., Gibbs, R.B., and Plant, T.M.  
Localization of Kisspeptin Cells and Axonal Fibers in the Pituitary of the Male Rhesus Monkey (*Macaca mulatta*)  
Annual Meeting of the Society for the Study of Reproduction (SSR), Kailua-Kona, Hawaii; May 2008
- Ramaswamy, S., Guierriero, K., Gibbs, R.B. and Plant T.M.  
Intimate and extensive interactions between kisspeptin and GnRH neurons in the median eminence of the rhesus monkey (*macaca mulatta*) indicate that kisspeptin control of GnRH release may be exerted at the level of GnRH terminals  
Annual Meeting of The Endocrine Society, San Fransisco, June 2008.
- Hammond, R., Nelson, D., and Gibbs, R.B.  
Distribution of GPR30 in rat forebrain and co-localization with cholinergic neurons  
40th annual Pharmaceutics Graduate Student Research Meeting, Ann Arbor, MI; June, 2008
- Gibbs, R.B., Mauk, R., Nelson, D. and Johnson, D.A.  
Donepezil restores estradiol's ability to enhance learning in aged rats  
Annual Meeting of the Society for Neuroscience, Washington, DC; November, 2008  
Soc. For Neurosci. Viewer/Itinerary Planner 2008, Program Number 794.20.

Hammond, R., Nelson, D., Ninaci, D., Mauk, R., and Gibbs, R.B.

Expressiion of GPR30 in the rat forebrain: Relevance to estrogen effects on basal forebrain cholinergic neurons and cognitive performance

Annual Meeting of the Society for Neuroscience, Washington, DC; November, 2008  
Soc. For Neurosci. Viewer/Itinerary Planner 2008, Program Number 794.24.

Hammond, R., Mauk, R., Ninaci, D., Nelson, D., and Gibbs, R.B.

GPR30 co-localizes with basal forebrain cholinergic neurons and enhances spatial learning  
13<sup>th</sup> Annual Meeting of the Society for Behavioral Neuroendocrinology, Michigan State University, East Lansing, MI; June, 2009

## GRANT PROPOSALS FUNDED

Functional characteristics of brain implants.

NIH NRSA Predoctoral Fellowship #MH08989 (1983-1986).

\$28,656 Robert Gibbs (Fellow), Carl Cotman (Supervisor).

Hormonal effects on CNS tissue transplants and on the regulation of trophic activities in the brain. NIH, NRSA Postdoctoral Fellowship #NS08195 (1987-1989).

\$38,992 Robert Gibbs, Ph.D. (Fellow), Donald Pfaff (Supervisor).

Effects of estrogen on NGF and NGF receptors in brain.

NIH 1 RO1 NS28896 (4/1/91-3/31/94).

Total: \$241,529 (Direct costs) R. Gibbs Principal Investigator.

Effects of estrogen on basal forebrain cholinergic function in aged rats.

University of Pittsburgh Pharmacy Association (1994)

\$3,000 R. Gibbs Principal Investigator.

Estrogen, basal forebrain cholinergic neurons, and aging.

NIH P50-AG05133 (S. DeKosky Principal Investigator)

Pilot study as part of the University of Pittsburgh Alzheimer's Disease Research Center grant (5/1/95-4/30/96)

\$10,000 (Direct costs). R. Gibbs Principal Investigator.

Effects of estrogen on NGF-related systems in brain. (Renewal)

NIH 2 RO1 NS28896 (4/1/94-3/31/98)

Total: \$345,039 Direct costs for 4/94-3/98. R. Gibbs Principal Investigator.

Effects of Estrogen on Cholinergic Activity and NGF Responses in Brain.

National Science Foundation IBN-9630851 (7/96-6/99)

Total: \$146,043 (Direct costs). R. Gibbs Principal Investigator.

Cell Imaging Core of the Center for Reproductive Physiology.

NIH 2 P30 HD08610 (4/96-3/00) T.M. Plant Principal Investigator

Total: \$235,965 Direct Costs for 4/96-3/00; R. Gibbs, Core Director.

Effects of Estrogen on NGF-Related Systems in Brain. (Renewal)

NIH 3 RO1 NS28896 (9/21/97-5/31/01)

Total: \$440,509 Direct Costs for 9/97-5/01. R. Gibbs Principal Investigator.

Estrogen, Cholinergic and GABAergic Activity, and Memory.

National Science Foundation IBN-9905676 (7/99-6/02)

\$145,000 Direct + Indirect for 7/99 – 6/02. R. Gibbs Principal Investigator.

\$4,050 Supplement to support Rachel Gabor summer research internship 5/01 - 7/01.

Effects of Estrogen on NGF-Related Systems in Brain. (Supplement)

NIH 3 RO1 NS28896 (9/1/99 – 5/31/00)

\$50,000 Direct. R. Gibbs Principal Investigator.

**GRANT PROPOSALS FUNDED (Continued)**

PACAP and Gonadotropin Secretion  
NIH 1 RO1 HD36034 (9/1/99 - 11/30/99)  
S. Winters Principal Investigator.  
\$1,971 Direct for R. Gibbs

Specialized Cooperative Center for Reproduction Research: Physiology and Pathophysiology of  
the Primate Gonad  
NIH 1 U54 HD08610 (4/1/00 - 3/31/05)  
T. Plant P.I.  
R. Gibbs - Director of Cell Imaging Core D  
\$181,392 Direct requested for 5 years

DHEAS, Sulfatase Inhibition & Cognition in Lesioned Rat.  
NIH 1 RO1 AG16261 (7/1/00-6/30/04)  
D. Johnson Principal Investigator  
R. Gibbs Co-Investigator  
\$70,801 Direct requested for R. Gibbs for 4 years

Effects of Raloxifene on Acquisition of a Spatial Memory Task: Correlations with Basal  
Forebrain Cholinergic Function and Glutamate Binding  
Eli Lilly, Inc. (4/1/01 - 3/31/03)  
\$36,356 Direct. R. Gibbs, Principal Investigator.

Development and Differentiation in the Reproductive Axis  
1 U54 HD41749-01 (7/01 - 7/06)  
D. Mann (Morehouse University) Principal Investigator  
R. Gibbs Co-Investigator  
\$145,224 Direct requested for R. Gibbs for 5 years

Comparison of Tibolone with Standard Hormone Replacement Therapy on Measures of Brain  
Function  
Organon Pharmaceuticals, Inc. (11/02 - 4/04)  
\$30,000 Direct. R. Gibbs, Principal Investigator

Estrogen-Induced Hippocampal Seizure Susceptibility  
NIH 2 RO1 NS037324 (7/02 - 6/04)  
C. Woolley Principal Investigator  
R. Gibbs Co-investigator  
\$20,000 Direct requested for R. Gibbs

Cholinergic Lesions and Age-Related Cognitive Impairment  
NIH 1 RO1 AG021471-01A1 (7/03 – 6/08)  
R. Gibbs principal investigator  
\$1,125,000 Direct for 5 years

**GRANT PROPOSALS FUNDED (Continued)**

A New Tool for Targeted Antisense Knockdown in Brain  
NIH 1 R21 NS046292-01A1 (01/05 – 12/06)  
R. Gibbs principal investigator  
\$231,250 Direct for 2 years

Novel Rehabilitative Approaches for Recovery from TBI  
NIH 1R01 HD046700-01A1 (12/04 -11/08)  
A. Kline, principal investigator  
\$22,172 Direct requested for R. Gibbs for 4 years

Effects of systemic administration of aromatase inhibitors on aromatase activity in rat brain, and on basal forebrain cholinergic neurons and cognitive performance.  
AFPE Scholarship to support Jasmine Talameh (7/05 – 6/06)  
R. Gibbs principal investigator  
\$5,000 for 1 year

Molecular and structural bases of hypothalamic puberty  
NIH 5R01 HD013254-21  
T. Plant principal investigator  
\$5,790 Direct per year for 5 years

Physiology and pathophysiology of the primate gonad  
NIH 2U54HD008610-31  
T. Plant principal investigator  
\$5,845 Direct per year for 5 years

LSM 510 Confocal Microscope  
NIH 1S10RR022515-01 (4/06 – 3/07)  
R. Gibbs principal investigator  
\$296,279 Direct

Cholinergic Lesions and Age-Related Cognitive Impairment  
NIH 3R01AG021471-05S1 (9/08 – 6/09)  
R. Gibbs principal investigator  
\$60,196 Direct

Restoration of Estradiol Effects on Learning by Cholinergic Enhancement  
NIH 1R21AG031794 (10/08 – 9/10)  
R. Gibbs principal investigator  
\$225,500 Direct for 2 years

Environmental Enrichment and Cholinergic Mechanisms After TBI  
NIH 1R01NS060005 (2/09 – 1/13)  
A. Kline principal investigator  
\$13,993 Direct for year 1

**GRANT PROPOSALS FUNDED (Continued)**

G-1 and Estrogenic Effects on Cholinergic Function and Cognitive Performance  
CRDF Proposal (7/31/09 – 7/30/11)  
R. Gibbs principal investigator  
\$16,000 Direct for 2 years