

PROFESSIONAL EXPERIENCE:

2000 - present University Distinguished Professor (Awarded by MUSC Board of Trustees, 9/01),
Departments of Psychiatry, Radiology and Neurology,
Medical University of South Carolina (MUSC) (With tenure, 1997).

2000 - present Director, MUSC Center for Advanced Imaging Research (CAIR)

2000 - present Director, Specialty Division, MUSC Psychiatry Department

1996 - present Director, Brain Stimulation Laboratory, MUSC

2002- present Adjunct Professor of Psychology, College of Liberal Arts, University of South Carolina

2003- present Statewide Co-director and MUSC Director, SC Statewide Brain Imaging Center of Excellence

1996 - 2004 Director, Psychiatric Neuroimaging, Ralph H. Johnson VA Medical Center, Charleston

1999 - 2000 Professor, Departments of Psychiatry, Radiology and Neurology, MUSC

1995 - 2000 Director, Functional Neuroimaging Research Division, Psychiatry Department, MUSC.

1995 - 1998 Associate Professor, Departments of Psychiatry, Radiology and Neurology, MUSC

1995 - 1997 Adjunct Professor/ Visiting Scientist, Biological Psychiatry Branch, NIMH.

1991 - 1995 Senior Staff Fellow, Biological Psychiatry Branch, National Institute of Mental Health,
Bethesda, MD

1990 - 1991 Visiting Research Fellow, Raymond Way Neuropsychiatry Research Group, Institute of
Neurology, Queen Square, London, England

1990 - 1991 Senior Registrar (Honorary), The National Hospital for Neurology and Neurosurgery,
Queen Square, London

1990 - 1991 Trainee, Institute of Nuclear Medicine, University College of London and Middlesex School of
Medicine, London

1989 - 1991 Clinical Instructor, Neurology and Psychiatry, MUSC

1989 - 1990 Chief Resident, Neurology, MUSC

1986 - 1990 Resident, Combined Neurology and Psychiatry Program, MUSC

1985 - 1986 Intern (Medicine, Neurology and Psychiatry), MUSC

SUPPLEMENTAL TRAINING:

Advanced Cardiac Life Support - approved, Charleston, S.C., September, 1989.

Nuclear Medicine 'Core of Knowledge' - Royal College of Nuclear Medicine, Course Given at the Royal Free
Hospital, London, October, 1990.

Statistics 500M - Statistics for Biomedical Scientists, Fall, 1991, Foundation for Advanced Education in the
Sciences, Inc.(FAES), NIH Biochemistry 533M - The Molecular and Cellular Basis of Intercellular
Communication, Fall, 1992, FAES, NIH

Computers 319 - Introduction to UNIX, Fall, 1992, FAES, NIH

OTHER WORK EXPERIENCE:

1982 - 1983 (Summers) Salmon Fisherman based in Kodiak, Alaska

1980 - 1981 Graduate Assistant, USC Philosophy Department

1976 - 1979 Staff Writer for *The Davidson Update*, Davidson NC

1977 - 1979 (Summers) Staff Writer for *The State Newspaper*, Columbia SC

1976 (Summer) Runway Stripper, The S.C. Aeronautics Commission

MEMBERSHIPS, PROFESSIONAL ORGANIZATIONS:

(p= past)

Alpha Omega Alpha (elected 3/00)
Academy of Psychosomatic Medicine (p), American Academy of Neurology (p)
American Association for the Advancement of Science
American Association for the Study of Headache (p)
American College of Neuropsychopharmacology (ACNP) (Full Member, 1999)
American Medical Association, American Neuropsychiatric Association
American Psychiatric Association, Association for Academic Psychiatry (p)
Behavioral Neurology Society (p), British Neuropsychiatry Association (visiting)
Charleston County Medical Society, International Society for the History of Neurosciences (p)
International Society for Neuroimaging in Psychiatry, Society of Biological Psychiatry
Society for Neuroscience, South Carolina Medical Society
South Carolina Psychiatric Association, Southern Association for Research in Psychiatry (p)

SCIENTIFIC, EDITORIAL AND MEDICAL ADVISORY BOARDS:

Member, American Psychiatric Association, Council on Research,
Committee on Research Training (1994-2001).
Member, American Psychiatric Association, Council on Research, Committee on ECT and other
Electromagnetic Brain Treatments (2001- present).
Chairperson, The rTMS Depression Consortium (6/96 - present)
The International Autistic Research Organisation (U.K.)(1991 - present).

Editor, North America, Human Psychopharmacology: Clinical and Experimental (1995 - 1999).

Guest Editor: Psychiatric Annals, 1994: 24,12
"The Emerging Neuroanatomy of Depression"
CNS Spectrums 1997:2
"Transcranial Magnetic Stimulation - A Neuropsychiatric Tool for the 21st Century"
Primary Psychiatry 1998: 5
"Advances in Brain Imaging: What the Primary Psychiatrist Needs to Know"
Epilepsy and Behavior, 2001
"Neurostimulation and Neuropsychiatric Disorders"
Journal of ECT, 2002
"Advances in Brain Stimulation"

Editorial Board: *Biological Psychiatry*
Current Review of Mood Disorders
CNS Spectrums: The International Journal of Neuropsychiatric Medicine
Depression and Anxiety
Neuroscience Imaging

Industry Advisory Boards:

Cyberonics Depression Scientific Advisory Board (6/01 - present)
Cyberonics Neuroscience Advisory Board (11/01 – present)
Neuronetics Depression Advisory Board (9/01 – present)
Depression Clinical Trial Steering Committee Member, Neuronetics (2003-present)

REVIEWER, JOURNALS:

American Journal of Psychiatry; Anxiety and Depression; Archives of General Psychiatry; Brain; Biological Psychiatry; Bipolar Disorders: An International Journal of Psychiatry and Neurosciences; Canadian Review of Neuroscience; Cerebral Cortex; Cognitive and Behavioral Neurology; Convulsive Therapy; Cortex; Depression and Anxiety; Human Psychopharmacology: Clinical and Experimental; International Journal of Neuropsychopharmacology; Clinical Neurophysiology; Journal of Abnormal Psychology; Journal of Affective Disorders; Journal of Nervous and Mental Disease; Journal of Neuroimaging; Journal of Neuropsychiatry and Clinical Neurosciences; Journal of the American Medical Association (JAMA); Journal of ECT; Journal of Theoretical Biology; Neurology; Neuropsychopharmacology; Neuropsychiatry, Neuropsychology and Behavioral Neurology; NeuroReport; Neuroscience; Neuroscience Methods; Pediatrics; Psychiatry Research; Psychological Medicine; Psychosomatics; Radiology; Science; Schizophrenia Research; The European Journal of Neuroscience; Trends in Cognitive Neuroscience.

REVIEWER, GRANTS:

Ad Hoc Reviewer: The Ontario Mental Health Foundation, VA Merit Reviews, National Institute on Drug Abuse, National Institute of Mental Health, NINDS, National Science Foundation, Human Frontiers in Science Program, Canada Medical Research Council, UK MRC.

REVIEWER, COLLEGES AND TRAINING PROGRAMS:

December, 2003 – Triennial External Peer Review – School of Behavioral and Cognitive Neurosciences, University of Groningen, Holland.

PUBLICATIONS

Letters:

1. **George MS**: Neuroscience and Psychiatry. Am J Psychiatry 1987; 144(8):1103.
2. **George MS**, Melvin JA, Mossman D: Mental illness and creativity. Am J Psychiatry 1988; 145(8):908.
3. Lydiard RB, **George MS**: Fluoxetine-related anorgasmia. So Med J 1989; 82(7):933-34.
4. **George MS**, Brewerton TD, Cochrane C: Trichotillomania and bulimia. N Engl J Med 1990; 322(7):470-471.
5. **George MS**, Pickett JB, Kohli H, Allison MA, Pritchard P: Paroxysmal Dystonic Reflex Choreoathetosis after minor closed head injury. The Lancet 1990; 336:1134-1135.
6. **George MS**, Kellner CH, Scott T, Malcolm R: Septum Pellucidum in schizophrenia (reply). J Neuropsychiatry Clin Neurosci 1990; 2(4):462.
7. Kellner CH, Burns C, Bernstein C, Monroe R, **George MS**: Safe administration of ECT in a patient with a calcified frontal mass. J Neuropsychiatry Clin Neurosci 1991; 3(3):353-354.
8. **George MS**, Post RM, Ketter T, Marengall L, Pazzaglia P: Alpidem as an antidepressant: clarification. J Clin Psychiatry, 1992; 53(2):68.
9. Kellner CH, **George MS**, Burns C, Bernstein H, Rubey R, Custer J, Brewerton T: Human equivalent of canine acral lick. The Lancet 1992; 339:553.

10. **George MS**, Trimble MR: Dystonia associated with fluvoxamine. J Clin Psychopharm 1993; 13:220-221.
11. **George MS**, Trimble MR: A fluvoxamine-induced frontal lobe syndrome in an obsessive compulsive patient. J Clin Psychiatry 1992; 53(10):379.
12. Brewerton TD, **George MS**, Harden RN: Migraine and the eating disorders. Psychiatry Res 1993; 46:201-202.
13. Ketter TA, Andreason PJ, **George MS**, Lee C, Gill DS, Parekh PI, Willis MW, Herscovitch P, Post RM: Reply to Sarvay SM re: Procaine and Anterior Paralimbic CBF changes. Archives of General Psychiatry 1997;54, 8:764-765.
14. **George MS**, Wassermann EM, Williams WE, Kimbrell TA, Little JT, Hallett M, Post RM: Reply to re: Mood Improvements Following Daily Left Prefrontal Repetitive Transcranial Magnetic Stimulation in Patients with Depression. American Journal of Psychiatry 1999; 156,4: 669-670.
15. Anton R, **George MS**, Myrick H, Drobos D: Reply to re: Activation of Prefrontal Cortex and Anterior Thalamus in Alcoholic Subjects on Exposure to Alcohol-Specific Cues. Archives 2001, In Press.
16. Kimbrell TA, Ketter TA, **George MS**, Little JT, Benson BE, Willis MW, Herscovitch P, Post RM: Reply to 'Regional cerebral glucose utilization in patients with a range of severities of unipolar depression. Biol Psychiatry 2002; 51 (3): 237-52.

Articles:

1987

1. **George MS**, Taylor R, Seay AR, Hogan EL: Sydenham's Chorea: A disease on the increase? J South Carolina Med Assoc 1987;83:523-527.

1989

2. **George MS**, Kellner CH, Fossey M: Obsessive-compulsive disorder in a patient with MS. J Nerv Ment Dis 1989;177:304-5.
3. **George MS**, Scott T, Kellner CK, Malcolm R: Abnormalities of the septum pellucidum in schizophrenia: Two case reports and a discussion. J Neuropsychiatry Clin Neurosci 1989;1:385-390.
4. **George MS**, Lydiard RB: Case report: Inability to walk as a symptom of panic disorder. Neuropsychiatry, Neuropsychol Behav Neurol 1989;2(3):219-223.

1990

5. **George MS**: Doing a combined residency. JAMA 1990;263:1628.
6. **George MS**, Mcleod-Bryant S, Lydiard RB, Kurent JE, Zealberg J: Panic attacks and agoraphobia associated with a giant right cerebral arteriovenous malformation. Neuropsychiatry, Neuropsychol Behav Neurol 1990;3(3):206-212.
7. **George MS**, Gross JA, Hogan EL, Kurent J, Plyler J, Perot PL: Establishing brain death in South Carolina: A clinician's guide. J South Carolina Med Assoc 1990;86(7):385-388.
8. Brewerton TD, **George MS**: The seasonal variation of migraine. Headache 1990;30(8):511-513.

1991

9. **George MS**: Establishing brain death: The potential role of nuclear medicine in the search for a reliable confirmatory test. Eur J Nuclear Med 1991;18:75-77.
10. Ring HA, **George MS**, Costa DC, Ell PJ: The use of neuropsychiatric activation procedures with single photon emission tomography: a review. Eur J Nuclear Med 1991;18:133-141.
11. **George MS**: Obsessive Compulsive Disorder. Int Clin Psychopharmacol 1991;6:57S-68S.
12. **George MS**, Lydiard RB: Speed of onset of action of the newer antidepressants: fluoxetine and bupropion. Int Clin Psychopharmacol, 1991, 6:209-217.

1992

13. **George MS**, Melvin JA, Kellner CH: Obsessive-compulsive symptoms in neurologic disease: A review. Behav Neurol 1992;5:19-30.
14. **George MS**, Trimble MR: The changing 19th century view of epilepsy as reflected in the West Riding Lunatic Asylum Medical Reports, 1871-1877, vols 1-6. Neurology 1992;42:246-249.
15. **George MS**: Early theories about the etiology of cerebral palsy: William Little and Sigmund Freud. J Hist Neurosci 1992;1:29-37.
16. **George MS**, Ballenger JC: The neuroanatomy of panic disorder: The role of the right parahippocampal region. J Anxiety Disord, 1992;6:181-188.
17. **George MS**, Ring HA, Costa DC, Kouris K, Ell PJ: Demonstration of Human Motor Cortex Activity Using SPECT. J Neural Transm, 1992, 87,3:231-236.
18. **George MS**, Costa DC, Kouris K, Ring HA, Ell PJ: Cerebral Blood Flow Abnormalities in Adults with Infantile Autism. J Nerv Ment Dis, 1992, 180, 7:413-417.
19. Ring HA, Trimble MR, Costa DC, **George MS**, Verhoeff P, Ell PJ: Effect of vigabatrin on striatal dopamine receptors: Evidence in humans for interactions of GABA and dopamine systems. J Neurol, Neurosurg, Psychiatry, 1992, 55:758-761.
20. **George MS**, Trimble MR, Costa DC, Robertson MM, Ell PJ: Elevated Frontal Cerebral Blood Flow in Gilles de la Tourette Syndrome (GTS): A ⁹⁹Tcm-HMPAO SPECT Study. Psychiatry Research - Neuroimaging, 1992, 45:143-151.

1993

21. **George MS**, Trimble MR, Ring HA, Sallee FR, Robertson MM: Obsessions in Obsessive-Compulsive Disorder (OCD) With and Without Gilles de la Tourette Syndrome (GTS). Am J Psychiatry, 1993, 150: 93-97.
22. **George MS**: A New Look at Obsessive-Compulsive Disorder and Gilles de la Tourette Syndrome. Clinical Advances in the Treatment of Psychiatric Disorders, 1993, 7:1-12.*
23. Brewerton TD, **George MS**: Is Migraine Related to the Eating Disorders? Int J Eating Disord 1993, 14:75-79.

24. Scott TF, Price TR, **George MS**, Brillman J, Rothfus W: Midline Cerebral Malformations and Schizophrenia. J Neuropsychiatry and Clinical Neurosciences 1993, 5:287-293.
25. **George MS**, Brewerton TD, Harden RN: Bulimia nervosa in outpatients with migraine. J Nervous Mental Disease 1993, 181;11:704-706.
26. **George MS**, Ketter TA, Gill D, Haxby JV, Ungerleider L, Herscovitch P, Post RM: Brain Regions Involved in Recognizing Facial Emotion or Identity: An O15 PET study. J Neuropsychiatry and Clinical Neuroscience 1993, 5;4:384-394.
27. Post RM, Ketter TA, Pazzaglia PJ, **George MS**, Marangell LB, Denicoff K: New Developments in the Use of Anticonvulsants as Mood Stabilizers. Neuropsychobiology, 1993, 27:132-137.
28. **George MS**, Ketter TA, Post RM: SPECT and PET Imaging in Mood Disorders. J Clin Psych 1993, 54[11,suppl]:6-13.
29. **George MS**, Trimble MR, Robertson MM: Fluvoxamine and Sulpiride in Comorbid Obsessive-Compulsive Disorder and Gilles de la Tourette Syndrome. Human Psychopharmacology: Clinical and Experimental 1993, 8:327-334.
30. Pazzaglia PJ, Post RM, Ketter TA, **George MS**, Marangell LB: Preliminary controlled trial of nimodipine in ultra-rapid cycling affective dysregulation. Psychiatry Research 1993, 49:257-272.

1994

31. **George MS**: Reanimating the Face: Early Writings by Duchenne and Darwin on the Neurology of Facial Emotion Expression. J Hist Neurosciences 1994, 2:21-33.
32. **George MS**, Rosenstein D, Rubinow DR, Kling MA, Post RM: CSF magnesium in affective illness: lack of correlation with clinical course or treatment. Psychiatry Research 1994, 51: 139-146.
33. **George MS**, Kellner CH, Bernstein H, Goust JM: A Magnetic Resonance Imaging Investigation into Mood Disorders in Multiple Sclerosis: A Pilot Study. The Journal of Nervous and Mental Disease 1994, 182, 7: 410-412.
34. **George MS**, Guidotti A, Rubinow D, Pan B, Mikaluskas K, Post RM: CSF Neuroactive Steroids in Affective Disorders: pregnenolone, progesterone and DBI. Biological Psychiatry 1994, 35: 775-780.
35. **George MS**, Ketter TA, Parekh PI, Rosinsky N, Ring H, Casey BJ, Trimble MR, Horwitz B, Herscovitch P, Post RM: Regional Brain Activity When Selecting a Response Despite Interference: An H₂¹⁵O PET study of the Stroop and an Emotional Stroop. Human Brain Mapping 1994, 1:194-209.
36. **George MS**, Ketter TA, Parekh P, Gill DS, Huggins T, Marangell L, Pazzaglia PJ, Post RM: Spatial Ability in Affective Illness: Differences in Regional Brain Activation During a Spatial Matching Task (H₂¹⁵O PET). Neuropsychiatry, Neuropsychology and Behavioral Neurology 1994, 7: 143-153.
37. Marangell L, **George MS**, Bissette G, Pazzaglia PJ, Huggins T, Post RM: Increased CSF thyrotropin-releasing hormone in affective disorder patients treated with carbamazepine. Arch Gen Psych 1994, 51: 625-628.
38. **George MS**, Lydiard RB: Social Phobia Secondary to Physical Disability: A review of benign essential tremor and stuttering. Psychosomatics. 1994, 35:520-523.

39. **George MS**, Ketter TA, Post RM: Prefrontal Cortex Dysfunction in Clinical Depression. Depression 1994, 2:59-72.
40. **George MS**, Wassermann E: Rapid-rate Transcranial Magnetic Stimulation (rTMS) and ECT (editorial). Convulsive Therapy 1994, 10(4): 251-253.
41. **George MS**: An Introduction to the Emerging Neuroanatomy of Depression. Psychiatric Annals 1994, 24,12: 635-636.
42. Ketter TA, **George MS**, Ring HA, Pazzaglia PJ, Marangell L, Kimbrell TA, Post RM: Primary Mood Disorders: Structural and Resting Functional Studies. Psychiatric Annals 1994, 24, 12: 637-642.
43. **George MS**, Ketter TA, Post RM: Activation Studies in Mood Disorders. Psychiatric Annals 1994, 24,12: 648-652.
44. **George MS**, Robertson MM, Costa DC, Ell PJ, Trimble MR, Pilowsky L, Verhoeff NPLG: Dopamine Receptor Availability in Tourette's Syndrome. Psych Res - Neuroimaging 1994,55:193-203.

1995

45. **George MS**, Ketter TA, Parekh PI, Horwitz B, Herscovitch P, Post RM: Regional Brain Activity During Transient Self-induced Sadness or Happiness in Healthy Women. American Journal of Psychiatry 1995,152: 341-351.
46. Parekh P, Spencer J, **George MS**, Gill D, Ketter TA, Horwitz, B, Andreason P, Herscovitch P, Post RM: Procaine-Induced Increases in Limbic rCBF Correlate Positively with Increases in Occipital and Temporal EEG Fast Activity. Brain Topography 1995,7:209-216.
47. **George MS**, Malloy L, Slate SO, Uhde TW: A Pilot MRI Study of Brain Size in Nervous Pointer Dogs. Anxiety, 1995, 1: 129-133.
48. **George MS**, Wassermann EM, Williams WA, Callahan A, Ketter TA, Basser P, Hallett M, Post RM: Daily Repetitive Transcranial Magnetic Stimulation (rTMS) Improves Mood in Depression. NeuroReport 1995, 6, 14:1853-1856.
49. Pazzaglia PJ, **George MS**, Post RM, Rubinow DR, Davis C: Nimodipine Increases CSF Somatostatin in Affectively Ill Patients. Neuropsychopharmacology 1995; 13: 75-83.
50. Ketter TA, Jenkins JB, Schroeder DH, Pazzaglia PJ, Marangell LB, **George MS**, Callahan AM, Hinton ML, Chao J, Post RM: Carbamazepine But Not Valproate Induces Bupropion Metabolism. J Clin Psychopharm 1995, 15: 327-333.
51. **George MS**: Emotion and the Brain. Clinical Advances in the Treatment of Psychiatric Disorders 1995; 9,6:14-16.*
52. Ketter TA, Flockhart DA, Post RM, Denicoff K, Pazzaglia PJ, Marangell LB, **George MS**, Callahan AM: The Emerging Role of Cytochrome P450 3A in Psychopharmacology. J Clin Psychopharmacology 1995;15,6:387-398.
53. **George MS**: The Clinical Use of SPECT in Depressive Disorders. Journal of Clinical Psychiatry 1995; 56: 542-544.

54. Schuckit MA, Jobst KA, **George MS**, VanHeertum RL: Difficult Differential Diagnoses in Psychiatry - The Clinical Use of SPECT. Journal of Clinical Psychiatry 1995; 56:539.

1996

55. Post RM, Weiss SR, Leverich GS, **George MS**, Frye M, Ketter TA: Developmental Psychobiology of Cyclic Affective Illness: Implication for Early Therapeutic Intervention. In, Chichetti D. and Tucker D. (eds) Development and Psychopathology. 1996; 8:273-305.
56. **George MS**, Wassermann EM, Williams W, Steppel J, Pascual-Leone A, Basser P, Hallett M, Post RM: Changes in Mood and Hormone Levels After Rapid- Rate Transcranial Magnetic Stimulation (rTMS) of the Prefrontal Cortex. J Neuropsychiatry and Clinical Neuroscience 1996; 8:172-180.
57. **George MS**, Parekh PI, Rosinsky N, Ketter TA, Kimbrell TA, Heilman K, Herscovitch P, Post RM: Understanding Emotional Prosody Activates Right Hemisphere Regions. Archives of Neurology 1996; 53:665-670.
58. Ketter TA, Andreason PJ, **George MS**, Herscovitch P, Post RM: Anterior Paralimbic Mediation of Procaine-induced Emotional and Psychosensory Experiences. Archives of General Psychiatry 1996;53:59-69.
59. Ketter TA, **George MS**, Kimbrell TA, Benson BE, Post RM: Functional Brain Imaging, Limbic Function, and Affective Disorders. The Neuroscientist 1996; 2,1:55-65.
60. Poltorak M, Wright R, Hemperly JJ, Frye M, **George MS**, Pazzaglia PJ, Jerrels S, Post RM, Freed WJ: Increased Neural Cell Adhesion Molecule in the CSF of Patients with Mood Disorder. J Neurochemistry 1996; 66:1532-1538.
61. **George MS**, Ketter TA, Parekh PI, Herscovitch P, Post RM: Gender Differences in rCBF During Transient Self-induced Sadness or Happiness. Biological Psychiatry 1996;40:859-871.
62. **George MS**, Wassermann EM, Post RM: Repetitive Transcranial Magnetic Stimulation (rTMS): A Neuropsychiatric Tool for the Twenty-First Century. J Neuropsychiatry Clin Neurosci 1996;8:373-382.
63. Samii A, Wassermann EM, Ikoma K, Mercuri B, **George MS**, O'Falon A, Dale JK, Straus SE, Hallett M: Decreased Post-Exercise Facilitation of Motor Evoked Potentials in Patients with Chronic Fatigue syndrome or Depression. Neurology 1996; 47:1410-1414.
64. Post RM, Ketter TA, Pazzaglia PJ, Denicoff K, **George MS**, Callahan A, Leverich G, Frye M: Rational polypharmacy in the bipolar affective disorders. Epilepsy Research - Supplement. 1996; 11:153-80.

1997

65. **George MS**, Post RM, Ketter TA, Kimbrell TA, Speer AM: Neural Mechanisms of Mood Disorders. Current Review of Mood and Anxiety Disorders. 1997; 1:71- 83.
66. Ketter TA, **George MS**, Kimbrell TA, Brenson BA, Post RM. Functional Brain Imaging in Mood and Anxiety Disorders. Current Review of Mood and Anxiety Disorders. 1997; 1:96-112.
67. **George MS**: TMS: An Issue Worthy of a Single Focus. CNS Spectrums. 1997;2, 1:17-18.
68. **George MS**, Speer AM, Wassermann EM, Kimbrell TA, Williams WA, Kellner CH, Risch SC, Stallings L, Post RM: Repetitive TMS as a Probe of Mood in Health and Disease. CNS Spectrums. 1997;2,1:39-44.

69. Martin JD, **George MS**, Greenberg BD, Wassermann EM, Schlaepfer TE, Murphy DL, Hallett M, Post RM: Mood Effects of Prefrontal Repetitive High-Frequency TMS in Healthy Volunteers. CNS Spectrums.1997;2,1:53-54.
70. **George MS**, Ketter TA, Parekh PI, Rosinsky N, Ring HA, Pazzaglia PJ, Marangell L, Post RM: Blunted Left Cingulate Activation in Mood Disorder Subjects During a Response Interference Task (The Stroop). J Neuropsychiatry Clin Neurosci. 1997; 9:55-63.
71. Marangell LB, Ketter TA, **George MS**, Pazzaglia PJ, Callahan AM, Parekh P, Andreason PJ, Horwitz B, Herscovitch P, Post RM. Thyrotropin-Stimulating Hormone Inversely Correlates With Brain Activity in Mood Disorders. American Journal of Psychiatry. 1997; 154,2:224-230.
72. Callahan AM, Frye MA, Marangell LB, **George MS**, Ketter TA, L'Herrou T, Post RM. Comparative Antidepressant Effects of Intravenous and Intrathecal Thyrotropin-Releasing Hormone: Confounding Effects of Tolerance and Implications for Therapeutics. Biological Psychiatry 1997; 41:264-272.
73. Post RM, Weis SRB, Ketter TA, Denicoff KD, George MS, Frye MA, Smith MA, Leverich GS. The Kindling Model: Implications for the Etiology and Treatment of Mood Disorders. Current Review of Mood and Anxiety Disorders 1997; 113-126.
74. Marangell LB, **George MS**, Callahan AM, Ketter TA, Pazzaglia PJ, L'Herrou TA, Leverich GS, Post RM Effects of Intrathecal Thyrotropin-Releasing Hormone (Protirelin) in Refractory Depressed Patients. Archives of General Psychiatry. 1997; 54:214-222.
75. **George MS**, Vincent DJ, Roberts DR, Bohning DE, Patel S, Vera C, Cure J, Horton J, Young J: Presurgical Mapping of Regional Brain Activity using Echoplanar BOLD fMRI. Advances in Clinical Research 1997 (Picker White Papers)*.
76. Greenberg BD, **George MS**, Dearing J, Benjamin J, Schlaepfer T, Altemus M, Wassermann EM, Hallett M, Murphy DL. Effect of Prefrontal Repetitive Transcranial Magnetic Stimulation (rTMS) in Obsessive Compulsive Disorder: A preliminary study. American Journal of Psychiatry 1997; 154:867-869.
77. Bohning DE, Pecheny AP, Epstein CM, Speer AM, Vincent DJ, Dannals W, **George MS**: Mapping transcranial magnetic stimulation (TMS) fields in vivo with MRI. Neuroreport 1997; 8: 2535-2538.
78. Fox P, Ingham R, **George MS**, Mayberg H, Ingham J, Roby J, Martin C, Jerabek P: Imaging Human Intra-Cerebral Connectivity by PET During TMS. NeuroReport 1997; 8: 2787-2791.
79. **George MS**, Ketter TA, Parekh P, Gill DS, Marangell L, Pazzaglia PJ, Herscovitch P, Post RM: Depressed Subjects Have Abnormal Right Hemisphere Activation During Facial Emotion Recognition. CNS Spectrums 1997; 2,10:45-55.
80. **George MS**, Wassermann EM, Williams WE, Kimbrell TA, Little JT, Hallett M, Post RM: Mood Improvements Following Daily Left Prefrontal Repetitive Transcranial Magnetic Stimulation in Patients with Depression: A placebo-controlled crossover trial. American Journal of Psychiatry 1997; 154:1752-1756.
81. Post RM, Kimbrell TA, McCann U, Dunn RT, **George MS**, Weiss SR: [Are convulsions necessary for the antidepressant effect of electroconvulsive therapy: outcome of repeated transcranial magnetic stimulation]. [French] Encephale. 23 Sep N03:27-35. 1997 June.
82. Roberts DR, Vincent DJ, Speer A, Bohning DE, Cure J, Young J, **George MS**: Multi-modality Mapping of Motor Cortex: Comparing Echoplanar BOLD fMRI and Transcranial Magnetic Stimulation. J Neural Transmission. 1997; 104 (8-9): 833-843.

83. Worthington C, Vincent DJ, Bryant AE, Roberts DR, Vera CL, Ross DA, **George MS**: Comparison of Functional Magnetic Resonance Imaging for Language Localization an Intracarotid Speech Amytal Testing in Presurgical Evaluation for Intractable Epilepsy: Preliminary Results. Stereotactic and Functional Neurosurgery 1997; 69:197-201.
84. Post RM, Kimbrell TA, Frye M, **George MS**, Mccann U, Little J, Dunn R, Li H, Weiss SRB: Implications of Kindling and Quenching for the Possible Frequency Dependence of rTMS. CNS Spectrums.1997;2,1:55-60.

Articles, 1998:

85. Bohning DE, Lorberbaum JP, Shastri A, Nahas Z, **George MS**: Structural Brain Imaging (CT and MRI) in Primary Psychiatry. 1998; 5(3): 46- 51.
86. Nahas Z, **George MS**, Lorberbaum JP, Risch SC: SPECT and PET in Neuropsychiatry. Primary Psychiatry. 1998; 5(3): 52 - 59.
87. Lorberbaum JP, Bohning DE, Shastri A, **George MS**: Functional Magnetic Resonance Imaging (fMRI) for the Psychiatrist. Primary Psychiatry. 1998; 5(3): 60 - 71.
88. **George MS**, Speer AM, Molloy M, Nahas Z, Teneback CC, Risch SC, Arana GW, Ballenger JC, Post RM: Low frequency daily left prefrontal rTMS improves mood in bipolar depression: a placebo-controlled case report. Human Psychopharmacology: Clinical and Experimental. 1998; 13:271- 275.
89. **George MS**, Huggins T, McDermet W, Parekh PI, Rubinow D, Post RM: Abnormal Facial Emotion Recognition in Depression: Serial testing in an ultra-rapid-cycling patient. Behavior Modification. 1998; 22,2: 192-204.
90. **George MS**: Why Would You Ever Want To?: Toward Understanding the Antidepressant Effect of rTMS. (Editorial) Human Psychopharmacology: Clinical and Experimental 1998; 13: 307-313.
91. Pridmore S, Filho JAF, Nahas Z, Liberatos C, **George MS**: Motor Threshold in Transcranial Magnetic Stimulation: a comparison of a neurophysiological and a visualization of movement method. The Journal of ECT 1998; 14: 25-27.
92. Bohning DE, Shastri A, Nahas Z, Lorberbaum JP, Andersen SW, Dannels W., Vincent DJ, **George MS**: Echoplanar BOLD fMRI of Brain Activation Induced by Concurrent Transcranial Magnetic Stimulation (TMS). Investigative Radiology 1998; 33(6):336-340.
93. Wassermann EM, Wedegaertner FR, Ziemann U, **George MS**, Chen R: Crossed Reduction of Motor Cortex Excitability by 1 Hz Transcranial Magnetic Stimulation. Neurosci Lett 1998; 250(3):141-144.
94. **George MS**: Advances in Brain Imaging; An Overview of What the Primary Psychiatrist Needs to Know. Primary Psychiatry 1998; 5(3): 37-45.
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182. Risch SC, Nahas Z, Horner MD, McGurk SR, Molloy M, Goldman J, Gilliard C, Owens SD, Christie S, Markowitz JS, DeVane CL, Mintzer J, **George MS**: Donepezil Augmentation of Antipsychotics in Schizophrenia: Cognitive and fMRI Effects. American College of Neuropsychopharmacology (ACNP) Mexico.
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192. **George MS**, Nahas Z, Lomarev M, Denslow S, Oliver NC, Shastri A, Bohning DE: Using Interleaved Vagus Nerve Stimulation (VNS) and BOLD fMRI to Examine Regional Brain Effects in Depressed Adults. Part of a symposium on ‘Beyond Correlational Imaging: Combining Functional Imaging with Brain Stimulation as New Neuroscience Tools’ (M George, Chair). American College of Neuropsychopharmacology (ACNP) 39th Annual Meeting, Dec. 12, 2000, San Juan, Puerto Rico.
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194. Nahas Z, Risch SC, Horner MD, Markowitz JS, Li X, Lorberbaum JP, McGurk S, Devane L, **George MS**: Augmenting an Atypical Antipsychotic with a Cognitive Enhancer (Donepezil) Improves Regional Brain Activity in Schizophrenia Patients: A Double-Masked Placebo Controlled BOLD phMRI Study. Poster, American College of Neuropsychopharmacology (ACNP) 39th Annual Meeting, Dec. 12, 2000, San Juan, Puerto Rico (p. 136).
195. Adinoff B, Devous MD, Best SM, **George MS**, Alexander D, Payne JK: Orbitofrontal Dysfunction in Cocaine Addiction: SPECT Following IV Procaine. Part of a symposium on ‘Addiction as a Disease of the Orbitofrontal Cortex’ (R. Anton, Chair). American College of Neuropsychopharmacology (ACNP) 39th Annual Meeting, Dec. 12, 2000, San Juan, Puerto Rico.
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199. Sackeim HA, Rush AJ, **George MS**, Marangell LB, Burt T, Hussain MM, Nahas Z, Johnson CR: Vagus Nerve Stimulation (VNS) in Outpatients With Treatment-Resistant Depression. Poster, American College of Neuropsychopharmacology (ACNP) 39th Annual Meeting, Dec. 12, 2000, San Juan, Puerto Rico (p. 311).
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- Schizopohrenia Patients: A Double-Blind Placebo Controlled Bold pHMRI Study. In Biological Psychiatry 2001, 49: #100, 29S.
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206. Teneback CC, **George MS**, Li X, Nahas Z, Kozel FA, Large C, Cohn J, Bohning DE: Lamotrigine Increases The TMS Motor Threshold And, Using Interleaved TMS/fMRI, Inhibits The BOLD Response To TMS Over Motor And Prefrontal Cortex. American College of Neuropsychopharmacology (ACNP) 40th Annual Meeting, Dec. 9, 2001, Waikoloa,Hawaii.
207. **George MS**, Rush AJ, Sackeim HA, Marangell LB, Nahas Z, Husain MM, Lisanby SH, Martinez JM: Vagus Nerve Stimulation (Vns) Continues To Show Therapeutic Benefit For Chronic Or Recurrent Treatment Resistant Depression Up To Two Years After Implant. American College of Neuropsychopharmacology (ACNP) 40th Annual Meeting, Dec. 9, 2001, Waikoloa,Hawaii.
208. **George MS**, Nahasz, Li X, Chae JH, Kozel FA: The Role of rTMS in Treatment Resistant Depression. In a Panel: Treatment Resistant Depression: The Role of Innovative Treatments. American College of Neuropsychopharmacology (ACNP) 40th Annual Meeting, Dec. 10, 2001, Waikoloa,Hawaii.
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211. Lorberbaum JP, Newman JD, Horwitz AR, Dubno JR, Lydiard RB, Hamner MB, Bohning DE, **George MS**: The Functional Neuroanatomy of Human Maternal Behavior. American College of Neuropsychopharmacology (ACNP) 40th Annual Meeting, Dec. 12, 2001, Waikoloa,Hawaii.
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213. Denslow S, Bohning DE, Lomarev MP, **George MS**: BOLD Activation in Motor Cortex Induced by TMS and Volitional Movement: Repeatability and Comparison of Location Assessed by Interleaved TMS/fMRI. International Society for Magnetic Resonance in Medicine (ISMRM).
214. **George MS**, Nahas Z, Li X, Chae JH, Lomarev M, Bohning DE: Multimodality Imaging and Novel Treatments for Mood Disorders. *Biol Psychiatry* 2002; 51:8S #23.
215. Conway CR, Chibnall JT, Fletcher J, Li X, **George MS**: Changes in Brain Metabolism in Response to Long-Term Vagus Nerve Stimulation (VNS) for Depression and Relationship to Clinical Response. *Biol Psychiatry* 2002; 51:8S #126.
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217. Kozel FA, Revell LJ, Lorberbaum JP, Shastri A, Smith A, Nahas Z, Nadeau B, Bohning DE, **George MS**: Regional Brain Correlates of Electrodermal Activity: A Pilot fMRI Study in Healthy Young Men. *Biol Psychiatry* 2002; 51:8S # 255.
218. Li X, Tang J, Wu Z, Zhao G, **George MS**, Lui C: Cerebral Hypoperfusion and Laterality and Psychopathology in Chinese Patients with Schizophrenia. *Biol Psychiatry* 2002; 51:8S # 343.
219. Nahas Z, Chae JH, Lomarev M, Denslow S, Anderson B, Kapp R, Bohning DE, **George MS**: Vagus Nerve Stimulation and fMRI in Treatment-Resistant Depression. *Biol Psychiatry* 2002; 51:8S #448.
220. Conway CR, Chibnall JT, Fletcher J, Li X, **George MS**: Changes in Regional Cerebral Blood Flow in Response to Acute Vagus Nerve Stimulation (VNS) in Depressed Patients and Prediction of Clinical Response. *Biol Psychiatry* 2002; 51:8S #544.
221. Li X, Teneback CC, Nahas Z, Kozel FA, Large C, Cohn J, Bohning DE, **George MS**: Lamotrigine Inhibits the Functional Magnetic Resonance Imaging Response to Transcranial Magnetic Stimulation in Healthy Adults. *Biol Psychiatry* 2002; 51:8S #567.

GRANT FUNDING:

FUNDED GRANTS (Past)

MUSC and UK Fellowship -Ciba-Geigy Grant, \$5,000; Solvay-Duphar Grant \$1,000; MUSC Resident Grant \$2,000.

NIMH Intramural Grant Funding - 4 years of full-time support within the NIMH, DIRP, Bethesda, MD. Principal investigator on numerous projects involving mood disorders and emotion regulation using cerebrospinal fluid, brain imaging and transcranial magnetic stimulation.

Co-investigator (5% - 5,000/year) - Pergolide in Children with Tourette's Syndrome, F.R. Sallee PI. \$428,336/ 3 years. Funded through the FDA, Orphan Drug Grant. Funded to begin 7/95.

Co-investigator - Limbic Sensitivity in Cocaine Addiction, Bryon Adinoff, PI. \$274,738, R21 National Institute on Drug Abuse (NIDA) Funding began 11/95.

Co-investigator - Phase II, Eight-week, Double-blind, Placebo-controlled Pilot Study Evaluating the Toleration, Safety and Efficacy of Oral Ziprasidone (Cp-88,059-1) in Children and Adolescents with Tourette's Syndrome. Pfizer Pharmaceuticals. Floyd R. Sallee, PI. Start Date 5/96.

Principal Investigator - MR Spectroscopy measurements of NAA and MI in Probable Alzheimer's Disease Patients Before and After Treatment with Milameline or Placebo, Small Grant (\$24,000) Parke-Davis.

Consultant - The Patrick and Catherine Weldon Donaghue Medical Research Foundation - Connecticut, - Dennis Charney, MD and Nash Boutros, MD co-principal investigators. Transcranial Magnetic Stimulation and Treatment of Depression.

Co-investigator - Parke-Davis protocol #979-15 A 52 week, randomized, double-blind, placebo-controlled, multicenter study of milameline in patients with probable Alzheimer's disease with extended open label treatment. J. Mintzer, MD MUSC PI. Start 7/96.

Principal Investigator - (\$60,000 over two years) - A Dose Finding Study of Left Prefrontal Rapid Transcranial Magnetic Stimulation (rTMS) to Treat Depression. 1996 NARSAD Young Investigator Award. Start Date 6/96.

Principal Investigator (10% salary for 2 years) Serial fMRI Perfusion Scans in Rapid-cycling Bipolar Affective Disorder Subjects: A pilot study using a novel non-invasive tool to longitudinally examine regional brain activity changes as a function of mood and disease progression. (\$150,000 over two years). Stanley Foundation 1996 Research Awards. Start Date 7/96.

Principal Investigator - Neurolite SPECT Imaging of rCBF as a Predictor of Response to Antidepressant Activity (Transcranial Magnetic Stimulation). (\$60,000 of radiotracer) Dupont Pharma. CG #96028 1997-99.

Principal Investigator (M. George) Neotonus : A Multi-Site Clinical Trial of rTMS in the Treatment of Unipolar Depression 4/98-4/99 5% Effort \$80,000

Principal Investigator - Fast MRI Brain Scanning in Alcoholism, \$25,000/year x 4 years - \$75,000, part of a \$1.7 million NIAAA Center Grant, James C. Ballenger, PI, Raymond F. Anton, and Carrie Randall, Coordinators. 2/95 - 2/99.

Principal Investigator - Volumetric and functional MRI scanning in schizophrenia patients before and after treatment with risperidone. Janssen Pharmaceutica. (\$58,750) 8/96 - 8/99.

Principal investigator - Volumetric and Functional (Perfusion) MRI scanning in schizophrenia patients before, during and after treatment with Olanzapine:Using Imaging to Document Speed of Response. Eli Lilly \$46,000 direct costs (Funded 4/97).

Principal Investigator (M George, PI) NARSAD Independent Investigator Award. Combining TMS with Echoplanar BOLD fMRI to Determine Optimum Treatment Parameters for Depression. 9/89-9/00. \$100,000.

Co-investigator - NARSAD (M. Beale, PI) rTMS Following a Single ECT: Antidepressant and Cognitive Effects 6/98 - 5/00 5% Effort \$60,000.

Co-investigator - MUSC Foundation for Research Development - IDEAS Grant (D. Bohning, PI) Phased-Solenoid Array Coil for Deep Focused Transcranial Stimulation. 1997-78 - \$30,000.

Principal Investigator - Prefrontal Transcranial Magnetic Stimulation for the Treatment of Depression in Bipolar Affective Disorder: A Pilot Study of Acute Efficacy and Preventive Maintenance.(150,000 over two years).Stanley Foundation 1998 Research Awards. Start Date 10/98.

Co-investigator (Mark Hamner, PI) VA Merit Neuroimaging in PTSD: Using IV Procaine and SPECT to Investigate Limbic Function 7/98 - 7/00 10% Effort \$120,000 annual

Co-investigator - Non-neuroleptic treatments of childhood Tourette's Syndrome. F.R. Sallee, PI. NIMH RO1 (10% salary over 5 years). (Funded 3/97). \$1,385,000 over 5 years.

Co-investigator - RO1 DA11434-01A1 Limbic Sensitivity in Cocaine Addiction Bryon Adinoff, MD PI. NIDA, Funded 2/6/97 3 years \$250,000/year. 20% effort. (M. George PI of Subcontract - 11,000/year).

Principal Investigator - Using Interleaved Transcranial Magnetic Stimulation (TMS) BOLD fMRI to measure cortical excitability and MRS glutamate over motor and prefrontal cortex in normal volunteers before and during treatment with lamotrigine. Glaxo/SmithKline - \$146,000 (5/01-10/03).

Principal Investigator - Defense Related Applications of Transcranial Magnetic Stimulation (TMS): Current Knowledge and a Focused, Applied Pilot Study– Defense Advanced Research Projects Agency (DARPA) - \$300,000 (6/01 – 6/02).

Principal Investigator (M. George, PI) Cyberonics, Inc. DOI - A Study of Vagus Nerve Stimulation in Patients with Depression: A Pilot and Efficacy Study 5/98-5/99 10% Effort \$240,000

Principal Investigator - The Functional Neuroanatomy of Borderline Personality Disorder: integrated fMRI and TMS studies testing dysfunctional circuits and developing a new treatment (\$450,000 over 3 years). Swiss Foundation for Research in Personality Disorders. 1/00-1/03.

Co-Principal Investigator (With DE Bohning, PhD) - Vagal Nerve Stimulation Synchronized fMRI - VNS/fMRI (Cyberonics), \$100,000 over one year (3/00-3/01).

Co-Principal Investigator (With DEB), Vagal Nerve Stimulation Synchronized fMRI - VNS/fMRI (Charles A. Dana Foundation for the Neurosciences). \$100,000 total (2 years).

Co-investigator - Using Left Prefrontal TMS to Treat Schizophrenia Patients with Comorbid Major Depression. (Z. Nahas PI). Neotonus. Start 1/00 - \$60,000 over two years.

Co-Principal investigator - Volumetric and functional MRI scanning in depression, social phobia and obsessive-compulsive disorder before and after treatment with fluvoxamine. Solvay-Duphar, \$20,000 (Funded 4/97).

Co-Investigator - Methodology for Interleaved TMS and fMRI. Daryl E. Bohning, PhD, PI. NIMH R21. \$212,681 Direct Costs over 3 years. Start 6/99. 5% effort.

Consultant - Swiss National Scientific Research Grants - T. Schlaepfer, MD, PI. Effect of Rapid Transcranial Magnetic Stimulation on Refractory Major Depression. Submitted 9/95, funding to begin 6/96. 7 years duration.

Principal Investigator - Phase I: An Initial Efficacy Test and Determination of the Optimum Dose of a New AMPAkinic Compound, CX516, on Measures of Sleepiness and Performance in Sleep-Deprived Adult Volunteers. Phase II: A Test for Replication, Coupled with BOLD fMRI to Determine the Regional Brain Activity Changes that CX516 Produces While Improving Sleep-Deprived Performance. Defense Advanced Research Projects Agency (DARPA) - \$275,000 over 1 year (start 4/03).

Principal Investigator - Creating a Man-Portable TMS System to Improve War-fighter Performance. Defense Advanced Research Projects Agency (DARPA) - \$6,700,000 over 5 years. (Start 6/02).

Principal Investigator - NIH, NINDS, RO1- AG40956 Mood Effects of Deep Brain Stimulation in Parkinson's Disease: A Combined DBS and MRI Study. \$1,441,050 over three years. 10% Effort (Funding starts 12/00).

Co-Investigator - Using fMRI to Develop New Treatments for Alcoholism, \$100,000/year x 4 years, part of a \$1.7 million/year NIAAA Center Grant Renewal, James C. Ballenger, PI, Raymond F. Anton, and Carrie Randall, Coordinators. 1/01-1/04.

Mentor - Jeff Lorberbaum, MD - VA National Award for Research Training in PTSD (Start 6/00, three years).

Co-investigator - Functional Imaging of the Human Brain in Health and Disease: Clinical and Research Applications. Academic Equipment Grant, Sun Microsystems. D.J. Vincent, PI. \$155,700 (Start 5/01).

Co-investigator/mentor - An fMRI Study of Healthy Mothers Hearing Infant Cries. - J Lorberbaum, PI. R01, NIH, \$459,632 over 3 years. 5% Effort. (Start 10/00).

FUNDED GRANTS (Current)

Overall Study Chairman and PI - Optimization of TMS for Depression: Coordinating Center Grant. NIMH 1 RO1 MH069887-01 1.6 million over 4 years (Start 9/04).

Co-Investigator (Nahas Z, local PI)- Optimization of TMS for Depression: MUSC Clinical Site Grant NIMH 1.25 million over 4 years (Start 9/04).

PI: M. George, Apr., 2004 – Sept., 2005, Stanley Medical Research Institute, 30% effort, \$280,000, “A Pilot Proof of Concept Study Assessing the Effects of DAR-0100 on Regional Brain Activity (Blood Flow and Task-Specific Activation) in Patients with Schizophrenia”. Goal: To test the effects of DAR-0100, as compared to placebo, on measures of resting blood flow in the prefrontal cortex of patients with schizophrenia.

Principal Investigator - A Long-Term, Prospective, Multicenter Study to Compare the Clinical, Quality of Life, Health Care Utilization and Productivity Outcomes of the NeuroCybernetic Prosthesis (NCP®) System to Standard-of-Care Treatment in Patients with Depression. Cyberonics, Inc.- \$52,000 (Start 1/01).

Principal Investigator - A Multicenter, Pivotal, Safety and Efficacy Study of Vagal Nerve Stimulation Delivered by the NeuroCybernetic Prosthesis (NCP®) System in Patients with Treatment Resistant Depression (Cyberonics, inc). \$407, 000 over three years (Start 8/00).

Principal Investigator - A Safety and Efficacy Multi-site Study of Vagus Nerve Stimulation (VNS™) using the NeuroCybernetic Prosthesis (NCP®) System in Patients with Refractory Anxiety Disorders. (\$300,000 over three years)(start 11/00).

Co-Principal Investigator – (With Prof. Gordon Baylis, USC, Columbia), Using Functional Magnetic Resonance Imaging (MRI) and Evoked Potentials (EP) to Understand Dysfunctional Attentional Networks in Young Adults with Attention Deficit Disorder. (MUSC, \$50,000/year over three years, Sponsor: SC Research Collaboration (Start 6/02).

Co-Investigator - (Z Nahas, PI) Prefrontal rTMS For Negative Symptoms Of Schizophrenia (\$350,000 over three years: NIMH) start 1/03.

Co-I: M.George, Jan., 2004–Dec., 2005, Ely Lilly & Co, 5% Effort, \$149,000, “Efficacy and Safety of Olanzapine in Patients with Borderline Personality Disorder: A Randomized Double-Blind Comparison with Placebo”. Goal: To assess the efficacy of olanzapine therapy as compared with placebo in patients with Borderline Personality Disorder.

Co-investigator – (D. Roberts, PI) Human Cerebral Cortex Plasticity in Response to Long-Term Microgravity Exposure. NASA Space Life Sciences - \$342,310 over 2 years (submitted 9/01).

Co-investigator (Nahas, PI) – A Randomized Multi-Center Study of Repetitive Transcranial Magnetic Stimulation (rTMS) in the Treatment of Refractory Depression Compared to A Sham Treatment. NeuroNetics, LLC. (230,000 over 14 months).

Consultant - Transcranial Magnetic Stimulation Treatment of Depression - David Avery, PI - R01, NIMH, \$1,008,696 over three years (funded 2/00).

Mentor - Hugh Myrick, PI - Training in Functional Imaging and Alcohol Withdrawal. NIAAA (K award) starts 7/00, \$695,250 over 5 years (Start 7/00).

Mentor – F. Andrew Kozel, MD - VA National Award for Research Training in PTSD (Start 6/01, three years).

Co-I (L.Key, PI).- Clinical Research Curriculum Award (CRCA) (to provide a broad-based, multidisciplinary, clinical research training program at the Medical University of South Carolina (MUSC)), NIH - \$300,000.

Mentor (Kozel, PI) – Investigating the Neurocircuitry of Geriatric Depression. NIMH K23. \$880,932 over 5 years (Start 6/04).

Mentor (Nahas, PI) – Training in Deep Brain Stimulation (DBS) and Rodent Antidepressant-Screen Models. NIMH K08. \$814,431 over 5 years (Start 6/1/04).

GRANT FUNDING: Grants Submitted and Under Review

Director, Imaging Core, SC Alzheimer’s Disease Research Center. NIH, NIA.

Co-Investigator (Bohning, PI) –Brain Network Modulation with Interleaved TMS/fMRI at 3T. NIBIB, \$2,227,906 over 5 years (Submitted 2/01/03).

Mentor (D. Roberts, PI) – MUSC Intramural Grants - Human Cerebral Cortex Plasticity in Response to Lower Limb Immobilization (Submitted 8/01).

Co-investigator and Imaging Core Director– R. Booze, PhD (USC) overall PI. NIH-NCRR. The SC Center of Biomedical Research Excellence in Neurodevelopmental Disorders. 5 years, Direct Costs: 554,779 (Submitted 2/03).

Mentor, Jon Halford PI - Developing a Neurophysiologic Test for Serotonergic Neurotransmission Using Auditory Evoked Potentials \$60,000 over 2 years. NARSAD. Submitted 7/03.

Patents and Invention Disclosures:

- 1) MR-Guided/MR-Compatible Pneumo-Mechanical TMS Coil Positioner TMS – with Daryl Bohning, PhD, Invention Disclosure, Filed 5/17/02. US Provisional Patent # 60/381,411.
- 2) System and Method of Using Synchronized Vagus Nerve Stimulation and functional MRI to Determine the Optimum Individual Settings of VNS as Therapy. with Daryl Bohning, PhD and Ziad Nahas, MD. Filed 5/3/02. US Provisional Patent # 60/377,692
- 3) System and Method of Detecting Deception by fMRI. With F. A. Kozel, MD. Invention Disclosure filed 12/20/01. Provisional Patent # 60/341,137.
- 4) Methods and System of Using Transcranial Magnetic Stimulation to Enhance Cognitive Performance. With Daryl E. Bohning, PhD. Invention Disclosure filed 3/25/02. #19113.0093U1, provisional 60/367,520.
- 5) System and Method of Inhibiting the Ability to Deceive Using Functional Magnetic Resonance Imaging- guided TMS. With F.A. Kozel. Invention Disclosure filed 12/02/01. Provisional 60/381,411.
- 6) Method and System of Using Interleaved TMS and fMRI to Assess the Regional Brain Effects of CNS active Compounds. With Daryl Bohning and Ziad Nahas. Filed 7/02.
- 7) Using Ampakine Compounds to Mitigate the Cognitive Deficits Caused by ECT or Other Forms of Brain Stimulation or Brain Surgery. With several others. ID Filed 8/03.
- 8) Systems for Using Psychophysiological Responses to Determine the Optimum VNS Dose for Individual Patients (Including a Method for Rapidly Determining TMS MT). With several others. ID filed 8/03.

Book and Chapter Reviews, published commentary:

Animal models of depression by Koob GF, Ehlers CL, Kupfer DJ (eds). Neurology 1990.

Emotions and the dual brain by Gainotti G, Caltagirone C (eds.) Neurology 1990;40,10:1640.

The triune brain in evolution: Role in paleocerebral functions, by Maclean, PD. Neuropsychiatry, Neuropsychology and Behavioral Neurology 1992:5,1:68-69.

Brainstem mechanisms of behavior by Klemm, Robert P. Vertes (eds.). Neuropsychiatry, Neuropsychology and Behavioral Neurology 1992:5,1:67-68.

Delirium: Acute confusional states by Lipowski ZJ. Neurology 1991;41:614.

Current and future trends in anticonvulsant, anxiety and stroke therapy by Meldrum BS and Williams M (eds). Neuropsychiatry, Neuropsychology and Behavioral Neurology 1992:5,1: 72-73.

Lateral Asymmetries and Hemispheric Specialization by Anke Bouma. Neurology 1991.

Foundations of the Neuron Doctrine by Gordon M. Shepherd. Neurology 1992; 42:1258-59.

Anxiety in the Elderly: Treatment and Research by Carl Salzman, Barry D. Lebowitz (eds). American Journal of Psychiatry 1993; 150:1264.

Biological Psychiatry (Vols 1 and 2) by G. Racagni, N. Brunello, T. Fukuda (eds). American Journal of Psychiatry 1993; 150:1558.

Hypnosis in the Treatment of Depressions: Strategies for Change by Michael Yapko. Neurology 1993;43:1275.

Aging and Neuropsychological Assessment by Asenath La Rue. Neurology 1993;43:1868.

Psychological Aspects of Depression by I.H. Gotlib, C.L. Hammen. American Journal of Psychiatry 1994;151:140.

Brain Activation by Per E. Roland. American Journal of Psychiatry 1994; 151:1515.

Neurobiology of Cingulate Cortex and Limbic Thalamus by B.A. Vogt, M. Gabriel (eds). Neurology 1994; 44:2425-2526.

Feminist Perspectives on Eating Disorders by P. Fallon. J Nervous and Mental Disease 1955; 183, 4: 275-276.

Seminars in Basic Neurosciences by G. Morgan, S. Butler (eds). American Journal of Psychiatry 1995; 152,4: 639-640.

The Neurology of Thinking by D. Frank Benson. Neurology 1995; 45: 1244.

Textbook of Geriatric Neuropsychiatry by C.E.Coffey, J Cummings (eds). American Journal of Psychiatry 1996; 153, 435.

"Evidence & Experience in Psychiatry" Volume 4, Chapter 5: OCD Spectrum. By Eric Hollander, M.D., Jennifer Rosen, B.S. World Psychiatric Association, 2000

Functional MRI: An Introduction to Methods. Eds Peter Jezzard, Paul N. Matthews, Stephen M. Smith, Oxford Medical Publications, 2002. Published in Radiology, 2002. ...

Current and Past Mentees and Current Academic Positions:

Past –(Updated 3/03)

Jon Halford, MD, Medical Student MUSC 1995,6 - Duke Neurology Residency, followed by Psychiatry Residency, and now doing Neuroimaging Research. Returned to MUSC Fall 2003 as an Assistant Professor in Neurology.

Andrew M. Speer, MD – Post-Psychiatry residency research fellow, 1995,6, Senior Staff Fellow, NIMH, DIRP, Bethesda, MD

Andrew Greenshields, MD – Medical Student, MUSC (1,2) 1996 – Matched as a First Year Resident in Radiology and Research MUSC

Courtney Bloomer, - Research Assistant, 1998-9 – now Second year medical student at Jefferson Medical School, Philadelphia, PA

Lucy McGavin, MD (now Lee) – Visiting Student, 1998-9 – now predoctoral student at the University College of London, Studying with the Functional Imaging Laboratory at Queen Square.

Susan Owens, - Research Assistant, 1998-9, now University of South Florida Graduate School in Psychology, doing functional imaging research.

Kathleen McConnell, - Now Senior medical student at MUSC, initially worked in the imaging lab as a research assistant for one year 1997-8, has continued to work on summers and part-time. Several peer-reviewed papers and chapters. Recently awarded a prestigious AOA grant for fMRI work in brain tumor patients. Currently pursuing residency training at Mt. Sinai in combined neuroradiology, neurology and neurosurgery.

Vidya Upadhaya, MD – Initially worked in the lab for one year as a research assistant following medical school (1996-7). She completed her psychiatry residency and did a one year clinical research fellowship with CDAP, followed by a more intensive NIDA research fellowship. She has published several peer-reviewed papers and has won several national honors. She most recently won an APA Program for Minorities in Research Training fellowship, which provided salary support for one year. Currently in private practice of psychiatry in Charleston, SC.

Jong-Ho Chae, MD, PhD - Visiting Scholar from Seoul, Korea to BSL and CAIR – 6/00 – 1/02. Now faculty at the Catholic University of Korea, Seoul.

Arif Najib, MD - Won a prestigious research fellowship from Tubingen, Germany as a medical student to study for one year with the CAIR. Designed a separation distress imaging study, published in the American Journal of Psychiatry. Now pursuing residency training in Germany.

Michael Lomarev, MD, PhD - Visiting Scholar from Institute of the Human Brain, St. Petersburg, Russia. Now a scientist with Dr. Mark Hallett's lab in the intramural NINDS program in Bethesda, MD.

Current –

Charlotte Teneback – Initially worked in the lab for one year following undergraduate graduation (1997-8). She left for graduate school in neuroscience and then returned and decided to apply for medical school due to a need for more clinically oriented research. She has worked for the past two years with Drs. Hamner and George on a VA Merit Grant. She is a Junior in the Medical School Class at MUSC. She has many publications and will work with the lab this summer again.

Andrew Kozel, MD – MUSC Psychiatry resident and Chief Resident. Currently a research fellow in the BSL.

Donna Roberts, MD – Former NASA scientist who worked with the lab as a MUSC Medical Student from 1996-1999. She has several prominent publications and won several national awards. She chose to stay at MUSC and do a Research Residency in Radiology, the first at MUSC and one of the first in the country. Currently a PGY2 Radiology Resident in a special research track. Recently won a prestigious RSNA award for salary for 1-2 years of focused imaging research at MUSC (Holman Research Pathway).

Jeff Lorberbaum, MD – Began at MUSC as a Post-residency clinical research fellowship in 1997 from Stanford. Most recently won a VA Neuroscience Award and an R01. Many publications and a rising star with several recent national honors.

Ziad Nahas, MD – Began here as a Post-residency clinical research fellow in 1997 from Baylor. Due to immigration issues, is not eligible for a K award but has been awarded an R21. He is a junior faculty in the MUSC Department of Psychiatry.

Hugh Myrick, MD – Junior Faculty in Psychiatry at MUSC. Collaborated with the imaging lab as a resident and junior faculty. Recently won a K-award from NIAAA to do functional brain imaging and alcohol.

XingBao Li, MD – Chinese National Scholarship and Visiting Scholar from Shangdong Province, China. Arrived 6/99. Continues with the BSL and CAIR as faculty.

Kaori Yamanaka, MD - Visiting Scholar from Tokyo, Japan – 1/01-4/03. Received PhD for her work with the BSL and CAIR, primarily around DARPA sleep deprivation work and functional brain imaging.

Chiwen Mu, MD, PhD – (2/02 to present) Visiting scientist from Beijing, China. Neuroradiologist. Has worked with NIDA program on phfMRI in Wisconsin.

Alexander Mishory, MD – Visiting Scholar from Israel.

Invited and Named Lectures, Visiting Professorships:

May, 1998 - Pfizer Visiting Professorship Award - UC Davis

Plenary Speaker, 4th International Conference on OCD, St. Thomas, VI, Feb, 2000. “Research and Clinical Advances in Brain Stimulation Techniques”.

Plenary Session, Annual Meeting of the Chinese Medical Association, Taipei, Taiwan, June, 2001: “Minimally Invasive Brain Stimulation.”

Guest Speaker, Human Systems Conference 2001, Exploring the Human Frontier. The International Conference on Technologies for Human Factors and Psycho-Social Adaptation in Space and Terrestrial Applications. June, 2001, Houston, TX. “Transcranial Magnetic Stimulation as a Treatment for Depression and Potential Tool on Long-Range Missions”

12th Annual Samuel Guze Memorial Lecture, Washington University (St.Louis) Psychiatry Department, November 6, 2001

Visiting Professor, University of Groningen, Holland (July, 2001)– Department of Biological Psychiatry. Gave several lectures on gender differences in brain activity with respect to emotion, as well as lectures on TMS and VNS.

Plenary Lecture, Annual Danish Psychiatric Association Meeting, March 2, 2003.

Keynote Address, 36th Annual Meeting of the Royal Australian and New Zealand College of Psychiatrists (RANZCP), Hobart, Australia, May 17, 2003 – Title: Tickling the Brain: An overview of new technologies for treating

depression.

AWARDS, ACTIVITIES AND HONORS:

High School:

Eagle Scout, Newspaper co-editor, soccer and cross-country team captain, president of the high school Honor Society, treasurer of the S.C. chapter of the National Honor Society, Boys State delegate.

College:

Charles Dana and Joseph McConnell Honor Scholar
National Honor Society Scholarship Recipient
Member, Debate Team
Member, Newspaper Staff
Cum Laude graduate

Internship and Residency:

Teaching

Nominated, 1986 MUSC Golden Apple Award.
Recipient, 1987 House Officers Excellence Award.
Recipient, 1988-89 Psychiatry Golden Apple Award.
Recipient, 1989 Association For Academic Psychiatry/Mead Johnson Fellowship in Academic Psychiatry.

Administration

Neurology representative, MUSC Executive Housestaff Committee, 1988-89.
Housestaff representative, MUSC Risk Management Committee, 1988-89.
Chief Resident, Neurology, 1989-90.
Recipient, 1989-90 American Medical Association/Burroughs Wellcome Leadership Program for Resident Physicians.
S.C. Delegate, Interim Meeting, American Medical Association Resident Physician Section, Dec. 1-2, 1989.
S.C. Delegate, Annual Meeting, American Medical Association Resident Physician Section, June 23-25, 1990.

Academic

Best Poster Presentation, American Association for the Study of Headache, 31st Annual Scientific Meeting, June 16-19, 1989. "A Study of the Seasonal Variation of Migraine."
1989 - The Benjamin C. Riggs Award for Best Resident Paper.
1989 - The Upjohn Young Investigators Award.
1990 - The Benjamin C. Riggs Award for Best Resident Paper.

Fellowship Training

American College of Neuropsychopharmacology (ACNP)/Mead Johnson Travel Awardee, ACNP Annual Meeting, San Juan Puerto Rico, December, 1992

NIMH Award for Excellence in Clinical Care and Research, 1993

American Neuropsychiatric Association Young Investigator Award, 1995

MUSC Faculty - Awards

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| 1996 | NARSAD Young Investigator Award |
| 1997 | Southern Association for Research in Psychiatry Outstanding Young Investigator Award |

1998 Pfizer Visiting Professorship Award - UC Davis
 1998 NARSAD Independent Investigator Award
 1998 Finalist, Glasgow College International Neuropsychopharmacology (CINP) Young Scientist Award
 2000 Member, SC Alpha Chapter of Alpha Omega Alpha (AOA), the National Honor Medical Society
 Circle of Excellence Award for Outstanding Teaching in the Doctoring Curriculum I Course
 Honorable Mention, NARSAD Gerald Klerman Award for Clinical Research
 2003 Circle of Excellence Award for Outstanding Teaching in the Doctoring Curriculum I Course

MUSC Faculty - Committees

1999-2000 Member, Ad Hoc Committee to Integrate Research with the New MUH Hospital 'Authority Status'
 1997-2000 Member, MUSC Institutional Review Board (IRB)
 1997-2000 Member, Ad Hoc Task Force on Feasibility of PET Imaging at MUSC
 1997-1998 Member, Search Committee for Neurology Chairman
 1999-2001 MUSC College of Medicine Faculty Senate
 1996-2001 Member, Undergraduate Medical School Curriculum Committee
 2000-2001 Member, Neuroscience Course Curriculum Change Committee--
 2001-2002 Chairman, MUSC Psychiatry Grand Rounds Committee
 2001-2002 Member, Radiology Department Chairman Search Committee
 2000-2002 Member, MUSC Psychiatry Department Management Team

 1998-present Member, MUSC Institutional Review Board (IRB) 1
 2000-present Faculty Advisor, Joint Neurology and Psychiatry Residency
 2001-present Director, Specialty Division, MUSC Psychiatry

HOBBIES:

Sailing, windsurfing, hiking, golf, canoeing.

MEMBERSHIPS, CIVIC ORGANIZATIONS:

Sierra Club
 The National Wildlife Federation
 The Nature Conservancy
 Sunrise Presbyterian Church
 Participant, Renaissance Weekend, 1997, 1998, 1999
 Room Father CV *Page 52*