

CURRICULUM VITAE

NAME: GRAEME FINLAY MASON
TITLE: Professor
Birth date: March 16, 1963
Birth place: Glasgow, Scotland
Citizenship: U.S.A.

EDUCATION

Institution	Degree	Year	Field of Study
Yale University New Haven, CT	Ph.D.	1991	Molecular Biophysics & Biochemistry
The Pennsylvania State University State College, PA	B.S. Minor	1986	Nuclear Engineering with Honors Spanish

RESEARCH AND PROFESSIONAL EXPERIENCE

2012-Present Professor, Yale University School of Medicine, Departments of Radiology & Biomedical Engineering and Psychiatry, Division of Bioimaging Sciences

2006-2012 Associate Professor, Yale University School of Medicine, Departments of Diagnostic Radiology and Psychiatry, Division of Bioimaging Sciences

2003-2006 Associate Professor, Yale University School of Medicine, Departments of Psychiatry and Diagnostic Radiology, Division of Bioimaging Sciences

2002-Present Director of Metabolic Modeling, Director of Psychiatric MRS, Yale Magnetic Resonance Research Center, Yale University, School of Medicine

1997-2003 Assistant Professor, Yale University School of Medicine, Dept. of Psychiatry
Director of the Psychiatric Magnetic Resonance Spectroscopy
Joint Appointment, Department of Bioimaging Sciences Program
New Haven, CT

1995-1997 Assistant Professor, University of Alabama at Birmingham, Dept. of Medicine, Div. of Cardiovascular Disease, Center for Nuclear Imaging Research, Birmingham, AL (joint appointment with Biomedical Engineering, 1997)

1994-1995 Instructor, University of Alabama at Birmingham, Dept. of Medicine

1993-1994 Postdoctoral Fellow, University of Alabama at Birmingham, Dept. of Medicine, Center for Nuclear Imaging Research, Birmingham, AL
Mentor: Dr. Hoby P. Hetherington

1991-1993 Postdoctoral Research Associate in the laboratory of Professor Robert G. Shulman
Department of Molecular Biophysics & Biochemistry, Yale University, New Haven, CT

1986-1991 Graduate Study, Department of Molecular Biophysics & Biochemistry
Yale University, New Haven, CT
Ph.D. Thesis Research Topic: Nuclear magnetic resonance studies of cerebral glucose transport and metabolism *in vivo*
Thesis Advisor: Professor Robert G. Shulman

1986 (summer) Research Assistant in Nuclear Magnetic Resonance, Hershey Medical Center
Supervisor: Dr. Richard Briggs

1985 and
1984 (summer) Co-op Engineer at Boiling Water Nuclear Reactor
Susquehanna Steam Electric Station; Plant Engineering and Technical Compliance Groups;
Pennsylvania Power & Light Company

HONORS

1986-1991 NIH Graduate Fellowship

1986 National Science Foundation Fellowship Honorable Mention

1984-1986 Institute of Nuclear Power Operations (INPO) Scholarship

1984-1986 John White Scholarship for Excellence in Spanish

1991 & 1992 Student Travel Awards, Society of Magnetic Resonance in Medicine

1997 Invited to Chair Session on ^{13}C Magnetic Resonance Spectroscopy at *Brain Energy*

- 1998-2000 *Metabolism* satellite meeting to Society of Neurochemistry, Waterville Valley, NH
 Stanley Foundation Young Investigator Award
 2000-2002 NARSAD Young Investigator Award
 2000 Honorable Mention – alternate for Memorial Travel Award for American College of Neuropsychopharmacology
 2002-2004 NARSAD Young Investigator Award
 2002 American College of Neuropsychopharmacology Memorial Travel Award
 2003,2004 Editor's Recognition Award for Reviewing with Special Distinction, *Radiology*
 2015 Elected Senior Fellow, *International Society of Magnetic Resonance in Medicine*
 2015 Promoted to Fellow, *American College of Neuropsychopharmacology*
 2007,2011, 2012,2014, 2015,2016 Editor's Recognition Award for Reviewing, *Biological Psychiatry*, Top 10 reviewers.

TEACHING

- 2001-2013 Created, organized, and team-taught "Metabolic Regulation and Magnetic Resonance" (Now listed as Yale Engineering and Applied Sciences #825a). The lecture notes take advantage of the electronic media by using computer animations of dynamic processes such as radiofrequency pulse effects and isotopic tracer behavior during kinetic metabolic experiments.
- 1997-2000 Organized Psychiatric Biochemistry Seminar, a weekly meeting designed (1) to foster contacts and collaborations between the Yale Department of Psychiatry and laboratories equipped with particular expertise to study brain chemistry (2) to educate technique-based investigators and biochemists about current questions in psychiatry, and (3) to educate Psychiatry-based investigators about the abilities and limitations of investigative methods, particularly magnetic resonance spectroscopy and imaging. The series consists of members of Yale Psychiatry and members of collaborative or potentially collaborative laboratories.
- 1997-2002 Organized the Neuroimaging Sciences Training Program Lecture Series, a bi-weekly series designed to educate fellows in the Yale Psychiatry's Neuroimaging Sciences Program in a variety of neuroimaging techniques, focusing when possible on multi-modality imaging. Speakers external to Yale were invited and hosted by members of Psychiatry, the Magnetic Resonance Center, and the Child Study Center. The speakers are asked to include in both didactic and research components in their Presentations.

PROFESSIONAL ACTIVITIES

- Member, American College of Neuropsychopharmacology, Research Society on Alcoholism, Society of Biological Psychiatry; International Society of Magnetic Resonance in Medicine; International Society for Biomedical Research on Alcoholism; International Society of Cerebral Blood Flow & Metabolism, Tau Beta Pi engineering national honor society; Alpha Nu Sigma nuclear engineering honor society (affil. American Nuclear Society)
- Editorial Board Member of *Biological Psychiatry*, 2002-present
 Editorial Board Member of *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, 2015-present
 Field Editor, *Alcohol: Experimental and Clinical Research*, 2016-present
 Reviewer for *Alcoholism: Clinical and Experimental Research*, *American Journal of Physiology*, *Alcohol and Alcoholism*, *Annals of Biomedical Engineering*, *Archives of General Psychiatry*, *Biological Psychiatry*, *Bipolar Disorders*, *Biotechnology Progress*, *Brain*, *Brain Research*, *Cerebral Cortex*, *Drug and Alcohol Dependence*, *Epilepsia*, *International Journal of Imaging Systems and Technology*, *Journal of Applied Physiology*, *Journal of Alzheimer's Disease*, *Journal of Biological Chemistry*, *Journal of Cerebral Blood Flow & Metabolism*, *Journal of Clinical Investigation*, *Journal of Engineering in Medicine*, *Journal of Magnetic Resonance*, *Journal of Neurochemistry*, *Journal of Neuroscience*, *Journal of Neuroscience Methods*, *Journal of Psychiatry & Neuroscience*, *Magnetic Resonance Imaging*, *Magnetic Resonance in Medicine*, *Medical Image Analysis*, *Neuropsychopharmacology*, *Neuroscience Letters*, *Neuroscience Research*, *NMR in Biomedicine*, *Proceedings of the National Academy of Sciences USA*, *Psychiatry Research: Neuroimaging*, *Psychological Medicine*, *Psychopharmacology*, *Radiology*, *Schizophrenia Bulletin*

- Member Neurotoxicity and Alcoholism (NAL) Study Section for NIH/NIAAA 2012; Member Neuropathology of Addiction and Sleep Disorders (NPAS) Study Section for NIH/CSR 2014-2016; Ad hoc grant reviewer for other NIH Review Sections; Center for Medicinal Cannabis Research; HIV Neurobehavioral Research Center; Idaho State Board of Education, South Carolina EPSCoR Program, U.S.-Israel Binational Science Foundation, Children's Hospital of Michigan – Wayne State University, HIV Neurobehavioral Research Center, Chronic Fatigue and Immune Dysfunction Syndrome Foundation, Alberta Heritage Foundation for Medical Research
- Member Scientific Advisory Board for the Chronic Fatigue and Immune Dysfunction Syndrome (CFIDS) Association of America (2005-2009)
- July 23, 1997 *Brain Energy Metabolism* satellite to *Neuroscience* meeting. Organized and chaired discussion session entitled “Metabolic Modeling of ¹³C Labeling”.
- May 5, 2001 Organized and chaired the symposium “Cortical GABA in Disease and Function” at the annual meeting of the *Society of Biological Psychiatry*, New Orleans, LA.
- Dec 12, 2001 Organizer and chair of study group entitled, “Use of the 13C-Labeled Tracers in MRS to Characterize Neuron-Glia Interactions in Glutamatergic and GABAergic Neurotransmission: Psychiatric Applications”, at the annual meeting of the *American College of Neuropsychopharmacology* (Waikoloa, Hawaii).
- 2001-2003 Conceived and organized Psychiatric Magnetic Resonance Study Group under the International Society of Magnetic Resonance in Medicine (ISMRM).
- 2003-2005 Chair of Psychiatric MR Study Group of the ISMRM
- 2005-2006 Past Chair of Psychiatric MR Study Group of the ISMRM
- 2003-2005 Member of the Study Group Review Committee, ISMRM
- 2002-2003 Member, organizing committee for the Symposium on Neuroimaging in Alcoholism, Jan 12-14, 2003, New Haven, CT, in collaboration with the Yale Center for Translational Neuroscience in Alcoholism.
- 2004-2008 Member, Education Committee of Center for Translational Neuroscience in Alcoholism
- 2004-2005 Co-Chair, organizing committee for the ISMRM Workshop on Magnetic Resonance Spectroscopy for Neuropsychiatric Disorders, October 14-17, 2005, Banff, Alberta, Canada
- 2006 External Examiner for Ph.D. defense of Atiyah Yayha, in the laboratory of Peter Allen, Ph.D., of the University of Alberta, Department of Biomedical Engineering
- 2006-2008 Member, Program Committee for the Research Society on Alcoholism
- 2008 Member, Research Priorities Committee for the Research Society on Alcoholism
- 2005-2008 Chair, organizing committee for the ISMRM Workshop on Magnetic Resonance Imaging and Spectroscopy for Neuropsychiatric Disorders, November 7-10, 2008, Quebec, Canada
- 2007-2008 Member, organizing committee for the Symposium on Neuroimaging in Alcoholism, Jan 12-14, 2008, New Haven, CT, in collaboration with the Yale Center for Translational Neuroscience in Alcoholism.
- 2007-2008 Ad-Hoc Presidential Appointee to Study Group Review Committee, ISMRM
- 2007 Chair and Organizer, Panel entitled “Smoking and GABA: an Avenue to Quit?”, *American College of Neuropsychopharmacology*, Boca Raton, Florida
- 2008 Co-chair of Educational Series, *Espectroscopia por Ressonância Magnética, Congresso IBRO/LARC de Neurociências da América Latina, Caribe, e Península Ibérica*, Búzios, Brazil
- 2009 Member, review group for ISMRM poster awards for Psychiatric MR Study Group
- 2009 Chair, Panel entitled “Efectos Neuroquímicos de Étanol y Nicotina”, *16º Congreso Internacional de Psiquiatría*, Buenos Aires, Argentina
- 2011-Present Member, Education Committee, Research Society on Alcoholism
- 2011-2014 Member, Program Committee for the 2012 and 2013 annual meetings of the Society of Biological Psychiatry
- 2012-2014 Chair-Elect, then Chair Psychiatric MR Imaging and Spectroscopy Study Group, ISMRM
- 2012 Organized and chaired the symposium “Quantitative fMRI in neuropsychiatry - the importance of BOLD change” at the annual meeting of the *Society of Biological Psychiatry*, Philadelphia, Pennsylvania, May 3
- 2013 Co-Chair, organizing committee for the ISMRM Workshop on Magnetic Resonance Imaging and Spectroscopy for Neuropsychiatric Disorders, September 7-10, 2013, Lisbon, Portugal
- 2014-present Member, Scientific Advisory Board for Alcohol Center, Medical University of South Carolina

DEPARTMENTAL, MEDICAL SCHOOL, AND UNIVERSITY COMMITTEES

Yale Human Investigation Committee (IRB) (member 2000-2004, consultant 2004-present)

2005-present Founder and Chair, Magnetic Resonance Research Center (MRRC) Protocol Review Committee

LANGUAGES

Fluent in English, Spanish, and Portuguese; functional in French

RESEARCH INTERESTS

1. ^{13}C isotopic labeling studies of brain metabolism.

Since 1988, I have been developing experimental models and methods for studies of brain metabolism using ^{13}C NMR in conjunction with ^{13}C isotopic labeling *in vivo*. The work began during my graduate studies at Yale, with the experimental determination of brain glucose transport kinetics and substrate competition for oxidative brain metabolism in a rat model. The work continued through my training at the University of Alabama at Birmingham, where I guided the group's ^{13}C -labeling studies of the human brain *in vivo* in the 4.1T whole-body MR system. Returning to Yale, I continue studies of the metabolism and neurotransmission in the human and animal brain *in vivo*, most recently studying healthy subjects and patients with neuropsychiatric disorders to investigate relationships among GABA, glutamate, and glutamine concentrations and their rates of synthesis and release in the brain.

2. Mathematical modeling analysis of biochemical pathways.

My major research interest has been the development and application of mathematical models for the determination of rates of metabolism and enzyme kinetics from ^{13}C NMR isotopic labeling experiments. The approach I have taken has been to integrate the modeling development into the design of experimental protocols by determination of the sensitivities of the calculated rates to the measured and assumed parameters of the system. The sensitivities are used to determine which parameters are critical to control or measure in particular experiments to obtain accurate results.

With the continuing development of improved NMR methods for isotopic analysis, I am extending the modeling through inclusion of additional pathways, as well as developing models for other metabolic systems, including liver, tumor cells, skeletal muscle, and pancreatic islet preparations. In addition, I plan to integrate the kinetic information with metabolic control analysis of the pathways for quantitative evaluation of metabolic regulation *in vivo*.

3. Neurotransmission in psychiatric diseases.

I develop and apply MRI and MRS methods together with mathematical analyses to understand the chemical bases of psychiatric disorders. My current focus is on alcoholism, its interactions with depression and nicotine, and its effects on brain metabolism.

A common path to understanding a system is to perturb it and measure its responses. Psychiatric disorders provide cases of perturbed brain function and chemistry that can be studied by MRS to provide quantitative input for the mathematical understanding of the regulation of brain metabolism. Another approach is to use pharmacologic challenges of brain metabolism and function with substances such as alcohol, simultaneously obtaining information that may be of use in understanding abuse and addiction to these substances.

GRANTS (P.I.)**Completed**

1. **Intermediary Metabolism in Alzheimer's Disease.**
 Source: Pilot grant from the Alzheimer's Disease Center,
 University of Alabama at Birmingham
 Effective dates: 7/1/94-6/30/95
 Role: P.I.
 Total Amount: \$20,000

2. **NMR Studies of GABA Metabolism and Regulation in vivo**
 Source: NIH/Yale University (KL Behar, P.I./G.F. Mason, P.I. at UAB)
 Effective dates: 4/1/96-9/13/97
 Role: Local P.I.
 Amount of Salary: 10%

3. **Clinical NMR Studies at 4.1T - A Research Resource**
 Source: NIH (HP Hetherington, P.D.) 1-P41-RR11811-01
 Effective dates: 3/01/97-2/29/00 (discontinued 9/13/97 due to move to Yale)
 Role: P.I. of Core V (Modeling and Experiment Design)
 Total Direct: \$245,144
 Total Indirect: \$107,863
 Total Cost: \$353,007
 Amount of Salary: 44%

4. **Mechanism of the Reduction of Cortical GABA in Unipolar Depression and Bipolar Disorder**
 Source: The Stanley Foundation
 Effective dates: 7/1/98-6/30/00
 Role: P.I.
 Total Costs: \$149,000
 Amount of Salary: 20%

5. **Mental Health Clinical Research Center**
 Source: NIH/NIMH
 Effective dates: 10/01/93 - 9/30/98
 Role: P.I. of MR Spectroscopy Core
 Total Costs: \$120,000
 Amount of salary: 20%

6. **Cortical GABA in Unipolar and Bipolar Depression**
 Source: NARSAD Young Investigator Award
 Effective dates: 7/1/00 – 6/30/02
 Role: P.I.
 Total Costs: \$60,000
 Amount of salary: 20%

7. **Thalamocortical Glutamatergic Function: Relationship to GABA Deficits in Depressed Patients**
 Source: NARSAD
 Effective dates: 7/1/02 – 6/30/05
 Role: P.I.
 Total Costs: \$60,000

8. **Nicotine Effects on Human Cortical Glutamate and GABA**
 Source: CENTURY (Yale Nicotine Center Pilot Project)
 Effective dates: 9/30/03-8/31/05
 Role: P.I.

Total Costs: \$25,000

9. **¹³C MRS Studies of Prefrontal Cortical Glutamate Release (Project 3 of NIAAA Center)**
 Source: National Institutes of Health (NIAAA)
 Effective dates: 6/1/01 – 5/31/06
 Role: P.I. of Project 3
 Total Costs: \$500,000 for Project 3
10. **Development of Non-Occipital, Multi-Volume GABA MRS at 4 Tesla**
 Source: Pfizer, Inc. (Graeme Mason)
 Effective dates: 1/1/05-12/31/06
 Role: P.I.
 Total Costs: \$376,000
11. **Recovery of Cortical GABA Systems with Sobriety: a Multimodality Study: Alcoholism Research Center**
 Source: VA Healthcare Systems
 Effective dates: 1/1/00 – 12/31/05
 Role: P.I., Magnetic Resonance Imaging Division
 Total Costs: \$1,600,000
12. **Quantitative MR Imaging and Spectroscopy in Alcoholism (NIAAA 1K02AA13430)**
 Source: National Institutes of Health (NIAAA)
 Effective dates: 5/1/02 – 10/31/07
 Role: P.I.
 Total Costs: \$ 510,854
13. **Brain MRS of Healthy Subjects Family History Positive and Negative for Alcoholism**
 Source: National Institutes of Health (NIAAA), pilot project in CTNA-2 (Center for Translational Neuroscience of Alcoholism)
 Effective dates: 6/1/06 – 5/31/08
 Role: P.I. of project (J. Krystal PI of Center)
 Total Costs: \$ 50,000
14. **Neurotransmitter Function, Psychiatric Disorders, & MRS (NIMH R13 MH080581)**
 Source: National Institutes of Health (NIMH)
 Effective dates: 9/1/07-3/15/09
 Role: P.I.
 Total Costs: \$15,000
15. **Imaging Nicotinic & GABAergic Markers in Tobacco Smokers (NIAAA P50-AA1532)**
 Source: National Institutes of Health, Project 2 of the Yale Transdisciplinary Tobacco Use Research Center (TTURC)
 Effective dates: 1/1/05-12/31/10
 Role: co-P.I.
 Total Costs: \$1,051,099
16. **GABA and Glutamate Impact of Genetic Vulnerability to Alcoholism**
 Source: Dana Foundation
 Effective dates; 9/1/05-8/31/10
 Role: P.I.
 Total Costs: \$100,000
17. **Role of Acetate in Heavy Drinking (NIAAA R21 AA018210)**
 Source: National Institutes of Health (NIAAA)

Effective dates: 4/15/09-4/14/12

Role: P.I.

Total Costs: \$742,500

18. Ethanol as Fuel for the Brain in Rats (NIAAA R21 AA019803)

Source: National Institutes of Health (NIAAA)

Effective dates: 7/10/10-6/30/13

Role: P.I.

Total Costs: \$439,405

19. GABA Effects of Nicotine in Men and Women (NIDA R01 DA021785)

Source: National Institutes of Health (NIDA)

Effective dates: 1/15/09-11/30/13

Role: P.I.

Total Costs: \$1,856,250

20. Neuroimaging Sciences Training Program (NIDA T32 DA022975)

Source: National Institutes of Health (NIDA)

Effective dates: 7/1/07 – 6/30/13

Role: P.I.

Total Costs: \$1,214,000

Active

1 Brain Acetate and Ethanol Metabolism in Alcohol Dependence and Abuse (R01 AA021984)

Source: National Institutes of Health (NIAAA)

Effective dates: 7/15/13-6/30/18

Role: P.I.

Total Costs: \$2,747,021

2. Neuroimaging Sciences Training Program (T32 DA022975)

Source: National Institutes of Health (NIDA)

Effective dates: 7/1/14 – 6/30/19

Role: P.I.

Total Costs: \$1,286,017

3. Comprehensive, Cross-Platform Validated ¹³C Flux Measures of Intra- and Inter Tissue Metabolism (R01 DK108283) (co-PI with R. Kibbey)

Source: National Institutes of Health (NIDDK)

Effective dates: 7/1/16-6/30/20

PUBLICATIONS

1. **Mason GF**, Rothman DL, Behar KL, Shulman RG (1992) NMR determination of TCA cycle rate and α -ketoglutarate/glutamate exchange rate in rat brain. *J Cereb Blood Flow Metab* 12: 434-447
2. **Mason GF**, Behar KL, Rothman DL, Shulman RG (1992) NMR determination of intracerebral glucose concentration and transport kinetics in rat brain in vivo. *J Cereb Blood Flow Metab* 12: 448-455
3. Gruetter R, Novotny EJ, Boulware SD, Rothman DL, **Mason GF**, Shulman GI, Shulman RG, Tamborlane WV (1992) Direct measurement of brain glucose concentrations in humans by ¹³C NMR spectroscopy. *Proc Natl Acad Sci USA* 89: 9603-9606 PMID: PMC48395
4. Rothman DL, Novotny EJ, Shulman GI, Howseman AM, Petroff OAC, **Mason GF**, Nixon T, Hanstock CC, Prichard JW, Shulman RG (1992) ¹H-¹³C NMR measurements of [4-¹³C]-glutamate turnover in human brain. *Proc Natl Acad Sci USA* 89: 9603-9606
5. **Mason GF**, Behar KL, Martin MA, Shulman RG (1993) Rat brain glucose concentration and transport kinetics determined with ¹³C nuclear magnetic resonance spectroscopy, in *Frontiers in Cerebral Vascular Biology: Transport and its Regulation*, Plenum Press, New York (ed. Drewes LR and Betz AL), 331: 29-34

6. Gruetter R, Novotny EJ, Boulware SD, Rothman DL, **Mason GF**, Shulman GI, Tamborlane WV, Shulman RG (1993) Non-invasive measurements of the cerebral steady-state glucose concentration and transport in humans by ^{13}C nuclear magnetic resonance, in *Advances in Experimental Medicine and Biology*, Plenum Press, New York (ed., Drewes LR and Betz AL), 331: 35-40
7. Price TB, Taylor R, Shulman GI, **Mason GF**, Rothman DL, Shulman RG (1994) Turnover of human muscle glycogen during low intensity exercise. *Med Sci Sports and Exercise* 26: 983-991
8. Hetherington H, Pan JW, **Mason GF**, Ponder SL, Twieg DB, Deutsch G, Mountz J, Pohost GM (1994) 2D spectroscopic imaging of the human brain at 4.1T. *Magn Reson Med* 32: 530-534
9. Hetherington HP, **Mason GF**, Pan JW, Ponder SL, Vaughan JT, Twieg DB, Pohost GM (1994) Evaluation of cerebral gray and white matter metabolite differences by spectroscopic imaging at 4.1T. *Magn Reson Med* 32: 565-571
10. **Mason GF**, Pan JW, Ponder SL, Twieg DB, Pohost GM, Hetherington HP (1994) Detection of brain glutamate and glutamine in spectroscopic images at 4.1T. *Magn Reson Med* 32: 142-145
11. Gruetter R, Novotny EJ, Boulware SD, **Mason GF**, Rothman DL, Shulman GI, Prichard JW, Shulman RG (1994) Localized ^{13}C NMR spectroscopy in the human brain of amino acid labeling from $[1-^{13}\text{C}]\text{D-glucose}$. *J Neurochem* 63: 1377-1385
12. **Mason GF**, Gruetter R, Rothman DL, Behar KL, Shulman RG, Novotny EJ (1995) Simultaneous determination of the rates of the TCA cycle, glucose utilization, α -ketoglutarate/glutamate exchange, and glutamine synthesis in human brain by NMR. *J Cereb Blood Flow Metab* 15: 12-25
13. **Mason GF**, Pohost GM, Hetherington HP (1995) Numerically optimized experimental design for measurement of grey/white matter metabolite T_2 in high-resolution spectroscopic images of brain. *J Magn Reson, Series B* 107: 68-73
14. Hetherington H, Kuzniecky R, Pan J, **Mason G**, Morawetz R, Harris C, Faught E, Vaughan T, Pohost G (1995) ^1H NMR spectroscopic imaging of human temporal lobe epilepsy at 4.1 Tesla. *Ann Neurol* 38: 396-404
15. Hetherington HP, Pan JW, **Mason GF**, Adams D, Vaughn MJ, Twieg DB, Pohost GM (1996) Quantitative high-resolution spectroscopic imaging of human brain *in vivo* at 4.1T using image segmentation. *Magn Reson Med* 36: 21-29
16. Pan JW, **Mason GF**, Pohost GM, Hetherington HP (1996) Spectroscopic imaging of human cerebral glutamate by J-refocused spectroscopic imaging at 4.1T. *Magn Reson Med* 36: 7-12
17. Hyder F, Chase JR, Behar KL, **Mason GF**, Siddeek M, Rothman DL, Shulman RG (1996) Increased tri-carboxylic acid cycle flux in rat brain during fore-paw stimulation detected by ^1H - $[^{13}\text{C}]$ nuclear magnetic resonance spectroscopy. *Proc Natl Acad Sci USA* 93: 7612-7617 PMID: PMC38794
18. Manor D, Rothman DL, **Mason GF**, Hyder F, Petroff OAC, Behar KL (1996) The rate of turnover of cortical GABA from $[1-^{13}\text{C}]\text{glucose}$ is reduced in rats treated with the GABA-transaminase inhibitor vigabatrin (γ -vinyl GABA). *Neurochem Res* 21: 1031-1041
19. Pan JW, **Mason GF**, Vaughan JT, Chu WJ, Zhang Y, Hetherington HP (1997) ^{13}C editing of glutamate in human brain using J-refocused coherence transfer spectroscopy at 4.1T. *Magn Reson Med* 37: 355-358
20. Sibson NR, Dhankhar A, **Mason GF**, Behar KL, Rothman DL, Shulman RG (1997) *In vivo* ^{13}C NMR measurements of cerebral glutamine synthesis as evidence for glutamate-glutamine cycling. *Proc Natl Acad Sci USA* 94: 2699-2704 PMID: PMC20152
21. **Mason GF**, Chu WJ, Pohost GM, Hetherington HP (1997) A general approach to numerically optimized design of experiments: application to multi-slice tissue segmentation via T_1 imaging in human brain. *J Magn Reson* 126: 18-29; correction for publisher's error in volume 126, number 2.
22. **Mason GF**, Harshbarger T, Hetherington HP, Pohost GM, Twieg DB (1997) A method to measure arbitrary k-space trajectories for rapid MR imaging. *Magn Reson Med* 38: 492-496
23. Hyder F, Rothman DL, **Mason GF**, Boucher RB, Behar KL, Shulman RG (1997) Oxidative glucose metabolism in rat brain during single forepaw stimulation: a spatially localized ^1H - $[^{13}\text{C}]$ NMR study. *J Cereb Blood Flow Metab* 17: 1040-1047
24. Hetherington HP, Pan JW, Chu W-J, **Mason GF**, Newcomer BR (1997) Biological and clinical MRS at ultra-high field. *NMR in Biomedicine* 10: 360-371
25. Sibson NR, Dhankhar A, **Mason GF**, Rothman DL, Behar KL, Shulman RG (1998) Stoichiometric coupling of brain glucose metabolism and glutamatergic neuronal activity. *Proc Natl Acad Sci USA* 95: 316-321 PMID: PMC18211

26. **Mason GF**, Chu WJ, Ponder SL, Vaughan JT, Adams D, Hetherington HP (1998) Evaluation of ^{31}P metabolite levels in grey matter and white matter using multi-slice tissue segmentation and spectroscopic imaging of human brain. *Magn Reson Med* 39: 346-353
27. Zhang Y, Hetherington HP, Stokely EM, **Mason GF**, Twieg DB (1998) A novel k-space trajectory measurement technique. *Magn Reson Med* 39: 999-1004
28. Chu WJ, Hetherington HP, Kuzniecky RI, Simor T, **Mason GF**, Elgavish GA (1998) Lateralization of human temporal lobe epilepsy by ^{31}P NMR spectroscopic imaging at 4.1T. *Neurology* 51: 472-479
29. Sibson NR, Shen J, **Mason GF**, Rothman DL, Behar KL, Shulman RG (1998) Functional energy metabolism: *in vivo* ^{13}C NMR evidence for coupling of cerebral glucose consumption and glutamatergic neuronal activity. *Dev Neurosci* 20: 321-330
30. **Mason GF**, Pan JW, Chu WJ, Zhang YT, Newcomer BD, Hetherington HP (1999) Measurement of the Tricarboxylic Acid Cycle Rate in Human Grey and White Matter *in vivo* by ^{13}C Magnetic Resonance Spectroscopy at 4.1T. *J Cereb Blood Flow Metab* 19: 1179-1188
31. Sanacora G, **Mason GF**, Rothman DL, Behar KL, Petroff OAC, Berman RM, Krystal JH (1999) Preliminary evidence of reduced cortical GABA levels in depressed patients assessed using ^1H -magnetic resonance spectroscopy. *Archives of General Psychiatry* 56: 1043-1047
32. Shen J, Petersen KF, Behar KL, Brown P, Nixon TW, **Mason GF**, Petroff OA, Shulman GI, Shulman RG, Rothman DL (1999) Determination of the rate of the glutamate/glutamine cycle in the human brain by *in vivo* ^{13}C NMR. *Proc Natl Acad Sci USA* 96: 8235-8240 PMID: PMC22218
33. Hyder F, Kennan RP, Kida I, **Mason GF**, Behar KL, Rothman D (2000) Dependence of oxygen delivery on blood flow in rat brain: a 7 Tesla nuclear magnetic resonance study. *J Cereb Blood Flow Metab* 20: 485-498
34. **Mason GF**, Lai JCK (2000) Nonlinear determination of Michaelis-Menten kinetics with model evaluation through estimation of uncertainties. *Metab Brain Disease* 15: 133-149
35. Pan JW, Stein DT, Telang F, Lee JH, Heydari S, **Mason G**, Rothman DL, Hetherington HP (2000) Spectroscopic imaging of glutamate C4 turnover in human brain. *Magn Reson Med* 44: 673-679
36. Novotny EJ, Ariyan C, **Mason G**, O'Reilly J Jr, Haddad GG, Behar KL (2001) Differential increase in cerebral cortical glucose oxidative metabolism during rat postnatal development is greater *in vivo* than *in vitro*. *Brain Research* 888: 193-202
37. Sibson NR, **Mason GF**, Shen J, Cline GW, Herskovits AZ, Wall JEM, Behar KL, Rothman DL, Shulman RG (2001) *In vivo* ^{13}C NMR measurement of neurotransmitter glutamate cycling, anaplerosis and TCA cycle flux in rat brain during [2- ^{13}C]glucose infusion. *J Neurochem* 76: 975-989
38. Goddard AW, **Mason GF**, Almai A, Rothman DL, Behar KL, Petroff OAC, Charney DS, Krystal JH (2001) Reductions in cortical GABA levels in panic disorder detected with ^1H -magnetic resonance spectroscopy. *Arch Gen Psychiatry* 58: 556-561
39. **Mason GF**, Martin DL, Martin SB, Manor D, Sibson NR, Patel A, Rothman DL, Behar KL (2001) Decrease in GABA synthesis rate in rat cortex following vigabatrin administration correlates with the decrease in GAD 67 protein. *Brain Research* 914: 81-91
40. Lebon V, Petersen KF, Cline GW, Shen J, **Mason GF**, Dufour S, Behar KL, Shulman GI, Rothman DL (2002) Astroglial contribution to brain energy metabolism in humans revealed by ^{13}C NMR spectroscopy: elucidation of the dominant pathway for neurotransmitter glutamate repletion and measurement of astrocytic oxidative metabolism. *J Neurosci* 22: 1523-1531 (cover article)
41. Sanacora G, **Mason GF**, Rothman DL, Krystal JH (2002) Increased cortical GABA concentrations in depressed patients after therapy with selective serotonin reuptake inhibitors. *Am J Psychiatry* 159: 663-665
42. Chu W-J, **Mason GF**, Pan JW, Hetherington HP, Liu H-G, San Pedro E, Mountz JM (2002) Regional cerebral blood flow and magnetic resonance spectroscopic imaging findings in diaschisis from stroke. *Stroke* 33: 1243-1248 (cover article)
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BOOK CHAPTERS

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13. **Mason GF**, Jiang L, Behar KL (2014) Compartmental Analysis of Metabolism by ¹³C Magnetic Resonance Spectroscopy. In *Neuromethods: Brain Energy Metabolism*, Waagepetersen H, Hirrlinger J, eds., Vol. 90, Chapter 13, pp. 293-339.
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INVITED ORAL PRESENTATIONS

1. **Mason GF** (1992) ^{13}C NMR studies of brain metabolism *in vivo*. Center for Nuclear Imaging Research, Department of Medicine, University of Alabama at Birmingham, Birmingham, AL, Sept. 13
2. **Mason GF** (1995) Assessment of models and determination of metabolic rates with models for ^{13}C -labeling at 2.1 and 4.1T. *Proc Soc Magn Reson 3rd Annual Mtg* (August: Nice France)
3. **Mason GF** (1996) Understanding brain metabolism with ^{13}C labeling. Department of Biomedical Engineering, University of Alabama at Birmingham, Birmingham, AL, March 26
4. **Mason GF** (1997) Quantitative Magnetic Resonance Imaging and Spectroscopic Studies at 4.1T. Department of Psychiatry, Yale University School of Medicine, New Haven, CT, January 13
5. **Mason GF** (1997) Quantitative Magnetic Resonance Imaging and Spectroscopy at 4.1 T. Department of Anatomy and Neurobiology, University of Kentucky, Lexington, KY, January 22
6. **Mason GF** (1997) ^{13}C isotopic labeling studies of the brain. Course on "Cutting Edge Spectroscopy", *Intern Soc Magn Reson Med, 5th Mtg*, Vancouver, Canada, April 14
7. **Mason GF** (1998) [^{13}C]-MR Spectroscopy of Glutamate, Glutamine, and GABA Turnover: Implications for Psychiatry, *Society of Biological Psychiatry*, Toronto, Canada, May 28
8. **Mason GF**, Sibson N, Hyder F, Shen J, Behar K, Krystal J, Shulman R, Rothman D (1998) The relationship of amino acid neurotransmission, neuronal metabolism, and cerebral blood flow. *American College of Neuropsychopharmacology*, December 15, Croabas, Puerto Rico
9. **Mason GF** (2001) Methods of MRS and Neuropsychiatric Applications. In: Issues of fMRI in Psychiatry. *Brown University, Hunter Psychology Laboratory*, October 24, 2001
10. **Mason GF** (2001) Methods of ^{13}C MRS Detection and Metabolic Modeling. *American College of Neuropsychopharmacology*, December, Kona, Hawaii
11. **Mason GF** (2002) MRS Methodology and Applications to Major Depressive Disorder. January 17, Indiana University and Purdue University, Department of Psychiatry
12. **Mason GF** (2003) Neuronal-Glial Interactions and Cellular Energetics. July 10th, Toronto, Canada, *International Society of Magnetic Resonance in Medicine*, Teaching Day
13. **Mason GF** (2003) Substrate Transport and Utilization by the Brain. July 12, Toronto, Canada, *International Society of Magnetic Resonance in Medicine, Dynamic Spectroscopy Study Group*
14. **Mason GF** (2004) Magnetic Resonance Spectroscopy: Methodology and Studies of Cortical GABA and Glutamate in Alcoholism and Nicotine Dependence. January 13, University of Connecticut Healthcare Center, Farmington, Connecticut, *General Clinical Research Center*
15. **Mason GF** (2004) Methodology of Magnetic Resonance Spectroscopy. January 17, New Haven, Connecticut, *International Conference on Applications of Neuroimaging to Alcoholism*
16. **Mason GF** (2004) Dynamic Measurements of Cortical GABA. May 15, Kyoto, Japan. *Psychiatry Study Group of the International Society of Magnetic Resonance in Medicine*
17. **Mason GF**, Behar KL, de Graaf RA, Patel AB, Sibson N, Shulman RG, Rothman DL (2004) Measuring cerebral energy and neurotransmitter metabolism *in vivo* with nuclear magnetic resonance. October 13. *Annual Meeting of the Biomedical Engineering Society*, abstract #421
18. **Mason GF** (2005) Psychiatric Applications of Magnetic Resonance Spectroscopy, May 7, Miami, Florida, *International Society of Magnetic Resonance in Medicine*
19. **Mason GF** (2005) MR Spectroscopic Studies of GABA and Glutamate in Psychiatry, August 22, Innsbruck, Austria, *International Society for Neurochemistry*, abstract #W3.C, p. 24 of the proceedings
20. **Mason GF** (2005) Metabolic Modeling and Experiment Design to Study Brain Metabolism. September 7, Cleveland, Ohio, *Case Western Reserve University Center for Modeling Integrated Metabolic Systems*
21. **Mason GF** (2005) GABA and Glutamate: Use in Neuropsychiatric Disorders, October 17, Banff, Alberta, Canada, *Neuropsychiatric Applications of MRS: Joint Educational Workshop of the Psychiatric MR and Dynamic Spectroscopy Study Groups*
22. **Mason GF** (2005) Studies of Neurotransmitters in Neuropsychiatric Disorders, November 4, Nashville, Tennessee, *Vanderbilt Brain Institute*
23. **Mason GF** (2006) MRS Studies of Neurotransmitter Metabolism, January 6, Edmonton, Alberta, Canada, *University of Alberta*
24. **Mason GF** (2007) Measurements of metabolic flow with multiple substrates, March 24, Louisville, Kentucky, University of Kentucky, *Second International Symposium on Metabolomics*
25. **Mason GF** (2007) Studies of brain glutamate and GABA with strategically selected labeling of isotopic substrates. Grand Rounds at University of Mississippi Medical Center, September 25, Jackson, Mississippi

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27. **Mason GF** (2008) Influences of acute nicotine and ethanol administration on brain metabolism. *Second International Conference on Applications of Neuroimaging to Alcoholism*, January 19, New Haven, Connecticut
28. **Mason GF** (2008) Espectroscopia Cerebral por Ressonância Magnética: Métodos, Limitações e Perspectivas, August 29, Departamento da Radiologia Diagnóstica por Imagem, Universidade Federal de São Paulo, SP, Brazil
29. **Mason GF** (2008) Espectroscopia nos Transtornos Psiquiátricos, August 29, Departamento da Psiquiatria, Universidade Federal de São Paulo, SP, Brazil
30. **Mason GF** (2008) Emprego da espectroscopia de ressonância magnética nuclear para determinação do GABA, glutamato e outros metabólitos no sistema nervoso central, September 2, *Congresso IBRO/LARC de Neurociências da América Latina, Caribe, e Península Ibérica*, Búzios, RJ, Brazil
31. **Mason GF** (2008) Variações do GABA e glutamato no córtex occipital de pacientes não alcoolistas durante infusão contínua de etanol, September 3, *Congresso IBRO/LARC de Neurociências da América Latina, Caribe, e Península Ibérica*, Búzios, RJ, Brazil.
32. **Mason GF** (2008) MRS Methodology for Studies of Alcoholism. *Joint INSERM-NIAAA Meeting*, October 3, Paris, France
33. **Mason GF** (2008) Basics of Cerebral Energetic and Amino Acid Neurotransmitter Metabolism, *ISMRM Workshop on MRS and Neurotransmitter Function in Neuropsychiatric Disorders*, in basic education session, November 7, Québec City, Québec.
34. **Mason GF** (2008) GABA and Glutamate in Neuropsychiatric Disorders, *ISMRM Workshop on MRS and Neurotransmitter Function in Neuropsychiatric Disorders*, plenary lecture, November 8, Québec City, Québec.
35. **Mason GF** (2008) Acute Administration of Nicotine and Ethanol: Effects on Neurochemistry. *ISMRM Workshop on MRS and Neurotransmitter Function in Neuropsychiatric Disorders*, substance abuse session, November 10, Québec City, Québec.
36. **Mason GF** (2009) Magnetic Resonance Spectroscopy Applied to Study Neurochemistry. May 3, Lanzhou University, Lanzhou, China.
37. **Mason GF** (2009) Neurochemical Effects of Acute Nicotine and Alcohol. May 4, Lanzhou University, Lanzhou, China
38. **Mason GF** (2009) Magnetic Resonance Spectroscopy and Neurotransmitters in Psychiatric Disorders. May 6, Wuhan, China
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