

Paul Mullins
Professor Teaching & Research
School of Psychology & Sport Science



Overview

Director of the Bangor Imaging Centre in the School of Human and Behavioural Sciences, home to a research dedicated 3T whole body MRI system used for functional and structural imaging studies.

Liaising with researchers from the College of Human Sciences on study design, data acquisition and processing and resources available to help with their research questions, my aim is to keep the Bangor Imaging Unit a world-class center for neuroimaging research in North Wales.

My personal research falls into three broad areas: development and validation of MRS techniques for the detection of neurotransmitters; the use of these techniques to measure changes associated with neurotransmission and neural activity in health and disease; and the use of magnetic resonance imaging to investigate basic neurologic and physiologic processes in health and disease. My current ongoing research however is focused on two of these areas: the study of functional neurochemical changes through the use of functional magnetic resonance spectroscopy (fMRS); and measurement of changes in cerebral physiology and blood flow.

fMRS

Based on the same principles as MRS, fMRS collects multiple MRS spectra in a dynamic series to study metabolite concentration changes during brain function. fMRS is able to measure changes in neurotransmitters over very short time scales, in seconds rather than minutes, either alone, or combined with other measures of neural activity such as EEG and BOLD. Direct measurement of neurotransmitter and neurometabolite changes allows fundamental questions to be addressed regarding the excitatory, inhibitory and metabolic processes underlying neural activity.

Cerebral Physiology

Understanding the what, how, and why, of cerebral blood flow (CBF) changes, has implications for many fields of research, from clinical conditions (stroke, brain injury, hypoxia, Alzheimers) to basic cognition (fMRI is based on blood flow changes). Similarly, it is important to understand the physiologic drivers for change, and what other changes in physiology affect CBF. Current work is investigating the effects of prolonged hypoxic exposure as might be experienced at altitude on CBF and cognition, the effects of healthy ageing, and possible relationships between resting levels of neurotransmitters and blood flow.

Teaching activities

I am the course director of the MSc in Neuroimaging, and lecturer for the "Introduction to Neuroimaging", "Introduction to Neuroimaging analysis", "Advanced Techniques in Neuroimaging" and "Advanced Neuroimaging analysis" modules. I have supervised 4 PhD students to completion, and currently have co-supervision of 4 others. I also supervise several MSc students' neuroimaging research projects that intersect with my labs research interests in neurochemistry and cerebral physiology, having already successfully supervised 28 MSc students to completion.

Wider Scientific Involvement

Recognizing the importance of open and shared science I am actively involved in collaborative research with colleagues in the USA, Ireland, Norway and the UK. I am also a well-respected member of the international magnetic resonance spectroscopy (MRS) research community, having been on the organizing committee for several international symposia, and recently involved in developing the Minimum Reporting Standards for Magnetic Resonance Spectroscopy.

[Lab Website](#)

Qualifications

Postgraduate, PhD, Application of Magnetic Resonance Imaging (MRI) to animal models of cerebral ischaemia, University of Queensland

Award Date: 15 Jun 2002

Postgraduate, Other, Biochemistry Honours, James Cook University of Far North Queensland, Townsville

Award Date: 15 May 1995

Undergraduate, BSc, Chemistry and Biochemistry, James Cook University of Far North Queensland

Award Date: 15 May 1993

Employment

Professor in Psychology

Professor Teaching & Research

School of Psychology & Sport Science

Bangor University

1 Aug 2019 → 31 Dec 2099

Vice Chair

NHS Wales Research Ethics Committee 5
United Kingdom
1 Jun 2012 → present

Activities

Ethics and consent for clinical trials

Paul Mullins (Speaker)
14 Jun 2021

Validation of the MSc in Cognitive Neuroscience

Paul Mullins (Contributor)
3 Jun 2021

PHOENIX GLOBAL RESEARCH ETHICS WORKSHOP

Paul Mullins (Speaker)
5 Oct 2020

External Examiner for MSc in Cognitive Neuroscience

Paul Mullins (Contributor)
1 Sept 2020 → ...

Review and validation of the Masters in Psychiatric Research

Paul Mullins (Examiner)
20 Nov 2019

Towards a Theory for Functional MRS

Paul Mullins (Speaker)
1 Apr 2019

Towards a Theory for Functional MRS

Paul Mullins (Speaker)
12 Mar 2019

Editing School

Paul Mullins (Speaker)
3 Dec 2018 → 6 Dec 2018

Magnetic Resonance Spectroscopy

Paul Mullins (Speaker)
13 Nov 2018

International Society for Magnetic resonance in Medicine

Paul Mullins (Speaker)
16 Jun 2018 → 21 Jun 2018

External Examiner for the undergraduate Neurosciences Program at Kings College London.

Paul Mullins (Examiner)
1 Jun 2018 → 30 Jun 2020

Towards a Theory for Functional Magnetic Resonance Spectroscopy

Paul Mullins (Speaker)

17 May 2018

Headway North Wales Conference

Paul Mullins (Invited speaker)

1 Mar 2017

International Society of Magnetic Resonance in Medicine Workshop on MR Spectroscopy

Paul Mullins (Chair)

16 Aug 2016

International Society of Magnetic Resonance in Medicine Workshop on MR Spectroscopy

Paul Mullins (Organiser)

15 Aug 2016 → 17 Aug 2016

International Society for Magnetic resonance in medicine workshop on MR spectroscopy

Paul Mullins (Speaker)

14 Aug 2016 → 17 Aug 2016

Research output

A comprehensive guide to MEGA-PRESS for GABA measurement

MRS Expert Panel & Mullins, P., 15 May 2023, In: Analytical biochemistry. 669, 115113.

Hypoxia alters posterior cingulate cortex metabolism during a memory task: a 1H fMRI study

Rogan, M., Friend, A., Rossetti, G. M. K., Edden, R. A. E., Mikkelsen, M., Oliver, S., Macdonald, J. & Mullins, P., 15 Oct 2022, In: Neuroimage. 260, 119397.

Chronic neuropsychiatric sequelae of SARS-CoV-2: Protocol and methods from the Alzheimer's Association Global Consortium

Alzheimer's Association Global SARS-COV-2 Consortium, 22 Sept 2022, In: Alzheimer's & dementia (New York, N. Y.). 8, 1, e12348.

Neurochemistry of response inhibition and interference in gambling disorder: A preliminary study of γ -aminobutyric acid (GABA+) and glutamate-glutamine (Glx)

Weidacker, K., Johnston, S. J., Mullins, P. G., Boy, F. & Dymond, S., Aug 2022, In: CNS Spectrums. 27, 4, p. 475-485 11 p.

Frequency drift in MR spectroscopy at 3T

Hui, S. C. N., Mikkelsen, M., Zöllner, H. J., Ahluwalia, V., Alcauter, S., Baltusis, L., Barany, D. A., Barlow, L. R., Becker, R., Berman, J. I., Berrington, A., Bhattacharyya, P. K., Blicher, J. U., Bogner, W., Brown, M. S., Calhoun, V. D., Castillo, R., Cecil, K. M., Choi, Y. B., Chu, W. C. W., Clarke, W. T., Craven, A. R., Cuypers, K., Dacko, M., de la Fuente-Sandoval, C., Desmond, P., Domagalik, A., Dumont, J., Duncan, N. W., Dydak, U., Dyke, K., Edmondson, D. A., Ende, G., Ersland, L., Evans, C. J., Fermin, A. S. R., Ferretti, A., Fillmer, A., Gong, T., Greenhouse, I., Grist, J. T., Gu, M., Harris, A. D., Hat, K., Heba, S., Heckova, E., Hegarty, J. P., Heise, K.-F., Jacobson, A., Jansen, J. F. A., Jenkins, C. W., Johnston, S. J., Juchem, C., Kangarlu, A., Kerr, A. B., Landheer, K., Lange, T., Lee, P., Levendovszky, S. R., Limperopoulos, C., Liu, F., Lloyd, W., Lythgoe, D. J., Machizawa, M. G., MacMillan, E. L., Maddock, R. J., Manzhurtsev, A. V., Martinez-Gudino, M. L., Miller, J. J., Mirzakhanian, H., Moreno-Ortega, M., Mullins, P. G., Near, J., Noeske, R., Nordhøy, W., Oeltzschnier, G., Osorio-Duran, R., Otaduy, M. C. G., Pasaye, E. H., Peeters, R., Peltier, S. J., Pilatus, U., Polomac, N., Porges, E. C., Pradhan, S., Prisciandaro, J. J., Puts, N. A., Rae, C. D., Reyes-Madrigal, F., Roberts, T. P. L., Robertson, C. E., Rosenberg, J. T., Rotaru, D.-G., O'Gorman Tuura, R. L., Saleh, M. G., Sandberg, K., Sangill, R., Schembri, K., Schranter, A., Semenova, N. A., Singel, D., Sitnikov, R., Smith, J., Song, Y., Stark, C., Stoffers, D., Swinnen, S. P., Tain, R., Tanase, C., Tapper, S., Tegenthoff, M., Thiel, T., Thioux, M., Truong, P., van Dijk, P., Vella, N., Vidyasagar, R., Vovk, A., Wang, G., Westlye, L. T., Wilbur, T. K., Willoughby, W. R., Wilson, M., Wittsack, H.-J., Woods, A. J., Wu, Y.-C., Xu, J., Lopez, M. Y., Yeung, D. K. W., Zhao, Q., Zhou, X., Zupan, G., Edden, R. A. E., Nakajima, S. L. & Honda, S., 1 Nov 2021, In: Neuroimage. 241, 118430.

Bilateral regional extracranial blood flow regulation to hypoxia and unilateral duplex ultrasound measurement error
Friend, A., Rogan, M., Rossetti, G., Lawley, J., Mullins, P., Sandoo, A., Macdonald, J. & Oliver, S., 1 Jul 2021, In: *Experimental Physiology*. 106, 7, p. 1535-1548 14 p.

Minimum Reporting Standards for in vivo Magnetic Resonance Spectroscopy (MRSinMRS): Experts' consensus recommendations

Experts' Working Group on Reporting Standards for MR Spectroscopy, 1 May 2021, In: *NMR in biomedicine*. 34, 5, e4484.

Reversal of neurovascular coupling in the default mode network: Evidence from hypoxia

Rossetti, G., d'Avossa, G., Rogan, M., Macdonald, J., Oliver, S. & Mullins, P., Apr 2021, In: *Journal of Cerebral Blood Flow and Metabolism*. 41, 4, p. 805–818 14 p.

Impulsive decision-making and gambling severity: The influence of γ-amino-butyric acid (GABA) and glutamate-glutamine (Glx)

Weidacker, K., Johnston, S. J., Mullins, P. G., Boy, F. & Dymond, S., Mar 2020, In: *European Neuropsychopharmacology*. 32, p. 36-46

Circadian circuits in humans: White matter microstructure predicts daytime sleepiness

Koller, K., Rafal, R. D. & Mullins, P. G., Jan 2020, In: *Cortex*. 122, p. 97-107 11 p.

Methodological consensus on clinical proton MRS of the brain: Review and recommendations

Wilson, M., Andronesi, O., Barker, P. B., Bartha, R., Buzzi, A., Bolan, P. J., Brindle, K. M., Choi, I-Y., Cudalbu, C., Dydak, U., Emir, U. E., Gonzalez, R. G., Gruber, S., Gruetter, R., Gupta, R. K., Heerschap, A., Henning, A., Hetherington, H. P., Huppi, P. S., Hurd, R. E., Kantarci, K., Kauppinen, R. A., Klomp, D. W. J., Kreis, R., Kruiskamp, M. J., Leach, M. O., Lin, A. P., Luijten, P. R., Marjańska, M., Maudsley, A. A., Meyerhoff, D. J., Mountford, C. E., Mullins, P. G., Murdoch, J. B., Nelson, S. J., Noeske, R., Öz, G., Pan, J. W., Peet, A. C., Poptani, H., Posse, S., Ratai, E-M., Salibi, N., Scheenen, T. W. J., Smith, I. C. P., Soher, B. J., Tkáč, I., Vigneron, D. B. & Howe, F. A., Aug 2019, In: *Magnetic Resonance in Medicine*. 82, 2, p. 527-550 24 p.

Regional Striatal Cholinergic Involvement in Human Behavioral Flexibility

Bell, T., Lindner, M., Langdon, A., Mullins, P. G. & Christakou, A., 17 Jul 2019, In: *Journal of Neuroscience*. 39, 29, p. 5740-5749 10 p.

Errors in H-MRS estimates of brain metabolite concentrations caused by failing to take into account tissue-specific signal relaxation

Gasparovic, C., Chen, H. & Mullins, P. G., Jun 2018, In: *NMR in biomedicine*. 31, 6, p. e3914

Functional neurochemical imaging of the human striatal cholinergic system during reversal learning

Bell, T., Lindner, M., Mullins, P. G. & Christakou, A., 23 May 2018, In: *European Journal of Neuroscience*. 47, 10, p. 1184-1193

Beyond static measures: A review of functional magnetic resonance spectroscopy and its potential to investigate dynamic glutamatergic abnormalities in schizophrenia

Jelen, L. A., King, S., Mullins, P. & Stone, J. M., 1 May 2018, In: *Journal of Psychopharmacology*. 32, 5, p. 497-508

Alleviating anxiety in patients prior to MRI: A pilot single-centre single-blinded randomised controlled trial to compare video demonstration or telephone conversation with a radiographer versus routine intervention

Tugwell, J. R., Goulden, N. & Mullins, P., May 2018, In: *Radiography*. 24, 2, p. 122-129

Towards a Theory of Functional Magnetic Resonance Spectroscopy (fMRS): A Meta-analysis and discussion of using MRS to measure changes in neurotransmitters in real time

Mullins, P., Feb 2018, In: *Scandinavian Journal of Psychology*. 59, p. 91-103

Aging-related microstructural alterations along the length of the cingulum bundle

Sibilia, F., Kehoe, E. G., Farrell, D., Kerskens, C., O'Neill, D., McNulty, J. P., Mullins, P. G. & Bokde, A., 1 Aug 2017, In: Brain connectivity. 7, 6, p. 366-372

What do people with dementia and their carers want to know about neuroimaging for dementia?

Featherstone, H., Butler, M-L., Ciblis, A., Bokde, A. L., Mullins, P. G. & McNulty, J. P., May 2017, In: Dementia. 16, 4, p. 461-470

In vivo functional neurochemistry of human cortical cholinergic function during visuospatial attention

Lindner, M., Bell, T., Iqbal, S., Mullins, P. G. & Christakou, A., 13 Feb 2017, In: PLoS ONE. 12, 2, e0171338.

Unexpected reductions in regional cerebral perfusion during prolonged hypoxia

Lawley, J., Oliver, S., Macdonald, J. & Mullins, P., 1 Jan 2017, In: Journal of Physiology. 595, 3, p. 935-947

The use of neuroimaging in dementia by Irish general practitioners

Ciblis, A. S., Butler, M-L., Bokde, A. L. W., Mullins, P. G. & McNulty, J. P., Aug 2016, In: Irish Journal of Medical Science. 185, 3, p. 597-602 6 p.

Current practice in the referral of individuals with suspected dementia for neuroimaging by General Practitioners in Ireland and Wales

Ciblis, A. S., Butler, M. L., Quinn, C., Clare, L., Bokde, A. L., Mullins, P. G. & McNulty, J. P., 23 Mar 2016, In: PLoS ONE.

¹H-MRS glutamate level predicts auditory sensory gating in alcohol dependence : Preliminary results

Thoma, R. J., Long, J., Monnig, M., Yeo, R. A., Petropoulos, H., Gasparovic, C., Pommy, J. & Mullins, P. G., 18 Dec 2015 , In: Neuropsychiatric electrophysiology. 1, 14.

Connectivity between the superior colliculus and the amygdala in humans and macaque monkeys: virtual dissection with probabilistic DTI tractography

Rafal, R. D., Koller, K., Bultitude, J. H., Mullins, P. G., Ward, R. A., Mitchell, A. S. & Bell, A. H., 1 Sept 2015, In: Journal of Neurophysiology. 114, 3, p. 1947-1962

The neural substrates for the different modalities of movement imagery

Jiang, D., Edwards, M. G., Mullins, P. & Callow, N., Jul 2015, In: Brain and Cognition. 97, p. 22-31

Event-related dynamics of glutamate and BOLD effects measured using functional magnetic resonance spectroscopy (fMRS) at 3T in a repetition suppression paradigm

Apsvalka, D., Gadie, A. M., Clemence, M. & Mullins, P. G., 10 Jun 2015, In: Neuroimage. 118, p. 292-300

The Subjective Experience of Pain: An fMRI Study of Percept-Related Models and Functional Connectivity

Wilcox, C. E., Mayer, A. R., Teshiba, T. M., Ling, J., Smith, B. W., Wilcox, G. L. & Mullins, P. G., 19 May 2015, In: Pain Medicine. 16, 11, p. 2121-2133

Neuroimaging referral for dementia diagnosis: The specialist's perspective in Ireland

Ciblis, A. S., Butler, M. L., Bokde, L. W., Mullins, P. G., O'Neill, D. & McNulty, J. P., 29 Mar 2015, In: Alzheimer's and Dementia: Diagnosis, Assessment and Disease Monitoring. 1, 1, p. 41-47

Fornix white matter is correlated with resting-state functional connectivity of the thalamus and hippocampus in healthy aging but not in mild cognitive impairment – a preliminary study

Kehoe, E. G., Farrell, D., Metzler-Baddeley, C., Lawlor, B. A., Kenny, R. A., Lyons, D., McNulty, J. P., Mullins, P. G., Coyle, D. & Bokde, A. L., 5 Feb 2015, In: Frontiers in Aging Neuroscience. 7, p. 1-10 10.

Prefrontal glutamate abnormality alters fronto-striatal relationship in subjects at ultra high risk for psychosis

Koychev, I., Winton-Brown, T., Egerton, A., Mullins, P., Kapur, S., Mathews, P., McGuire, P. & Stone, J., Nov 2014, In: Early Intervention in Psychiatry. 8, p. 60-60

Advances in MRI biomarkers for the diagnosis of Alzheimer's disease

Kehoe, E. G., McNulty, J. P., Mullins, P. G. & Bokde, A. L. W., 1 Oct 2014, In: Biomarkers in Medicine. 8, 9, p. 1151-69 19 p.

The salience network is responsible for switching between the default mode network and the central executive network: Replication from DCM

Goulden, N., Khusnulina, A. A., Davis, N. J., Bracewell, R. M., Bokde, A. L., McNulty, J. P. & Mullins, P. G., 1 Oct 2014, In: Neuroimage. 99, p. 180-190

Access to Neuroimaging in Dementia: A Survey of Specialists

Ciblis, A., Butler, M-L., Bokde, A., Mullins, P., O'Neill, D. & McNulty, J., Sept 2014, In: Irish Journal of Medical Science. 183, p. S330-S330

Anabolic exercise in haemodialysis patients: a randomised controlled pilot study

Kirkman, D., Mullins, P. G., Junglee, N. A., Kumwenda, M., Jibani, M. M. & Macdonald, J. H., Sept 2014, In: Journal of Cachexia, Sarcopenia and Muscle. 5, 3, p. 199-207

Prolonged (9 h) poikilocapnic hypoxia (12% O₂) augments cutaneous thermal hyperaemia in healthy humans

Lawley, J. S., Oliver, S. J., Mullins, P. G., Macdonald, J. H. & Moore, J. P., 1 Jun 2014, In: Experimental Physiology. 99, p. 909-920

Normobaric hypoxia and symptoms of acute mountain sickness: Elevated brain volume and intracranial hypertension

Lawley, J. S., Alperin, N., Bagci, A. M., Lee, S. H., Mullins, P. G., Oliver, S. J. & Macdonald, J. H., 20 May 2014, In: Annals of Neurology. 75, 6, p. 890-898

The neural correlates of beauty comparison

Kedia, G., Mussweiler, T., Mullins, P. G. & Linden, D., May 2014, In: Social Cognitive and Affective Neuroscience. 9, 5, p. 681-688

Current practice in the use of MEGA-PRESS spectroscopy for the detection of GABA

Mullins, P. G., McGonigle, D. J., O'Gorman, R. L., Puts, N. A. J., Vidyasagar, R., Evans, C. J., Edden, R. A. E. & Cardiff Symposium on MRS of GABA, 1 Feb 2014, In: Neuroimage. 86, p. 43-52 10 p.

Glutamatergic correlates of gamma-band oscillatory activity during cognition: A concurrent ER-MRS and EEG study

Lally, N., Mullins, P. G., Roberts, M. V., Price, D., Gruber, T. & Haenschel, C., 15 Jan 2014, In: Neuroimage. 85, Part 2, p. 823-833

Reproducibility of 1H-MRS measurements in schizophrenic patients

Mullins, P. G., Rowland, L., Bustillo, J., Bedrick, E. J., Lauriello, J. & Brooks, W. M., Oct 2013, In: Magnetic Resonance in Medicine. 50, 4, p. 704-707 4 p.

Investigation of whole-brain white matter identifies altered water mobility in the pathogenesis of high-altitude headache

Lawley, J., Oliver, S. J., Mullins, P. G. & Macdonald, J. H., 1 Aug 2013, In: Journal of Cerebral Blood Flow and Metabolism. 33, 8, p. 1286-1294

Optic Nerve Sheath Diameter Is Not Related to High Altitude Headache: A Randomized Controlled Trial

Lawley, J. S., Oliver, S. J., Mullins, P. G., Morris, D., Junglee, N. A., Jolleyman, C. & Macdonald, J. H., 1 Sept 2012, In: High Altitude Medicine and Biology. 13, 3, p. 193-199

Arteriovenous fistula complication following MRI

Kirkman, D., Junglee, N. A., Mullins, P. G. & Macdonald, J. H., 27 Aug 2012, In: British Medical Journal Case Reports.

Perturbation of the Glutamate-Glutamine System in Alcohol Dependence and Remission

Thoma, R., Mullins, P. G., Ruhl, D., Monnig, M., Yeo, R. A., Caprihan, A., Bogenschutz, M., Lysne, P., Tonigan, S., Kalyanam, R. & Gasparovic, C., 9 Mar 2011, In: *Neuropsychopharmacology*. 36, 7, p. 1359–1365

Glutamate as a marker of cognitive function in Schizophrenia: a proton spectroscopic imaging study at 4 Tesla.

Bustillo, J. R., Chen, H., Gasparovic, C., Mullins, P. G., Caprihan, A., Qualls, C., Apfeldorf, W., Lauriello, J. & Posse, S., 1 Jan 2011, In: *Biological Psychiatry*. 69, 1, p. 19-27

¹H-MRS at 4 Tesla in minimally treated early schizophrenia.

Bustillo, J. R., Rowland, L. M., Mullins, P. G., Jung, R., Chen, H., Qualls, C., Hammond, R., Brooks, W. M. & Lauriello, J., 1 Jun 2010, In: *Molecular Psychiatry*. 15, 6, p. 629-636

Elevated cerebral blood flow and volume in systemic Lupus measured by dynamic susceptibility contrast magnetic resonance imaging.

Gasparovic, C. M., Roldan, C. A., Sibbitt, W. L., Qualls, C. R., Mullins, P. G., Sharrar, J. M., Yamamoto, J. J. & Bockholt, H. J., 1 Sept 2009, In: *Journal of Rheumatology*. 37, 9, p. 1834-1843

Quantitative Spectroscopic Imaging with In Situ Measurements of Tissue Water T-1, T-2, and Density.

Gasparovic, C., Neeb, H., Feis, D. L., Dambaru, E., Chen, H., Doty, M. J., South, D. M., Mullins, P. G., Bockholt, H. J. & Shah, N. J., 1 Sept 2009, In: *Magnetic Resonance in Medicine*. 62, 3, p. 583-590

Alteration of the Glutamine-Glutamate cycle in Chronic Alcoholism.

Ruhl, D. A., Gasparovic, C., Mullins, P. G., Yeo, R. A. & Thoma, R. J., 20 Jun 2009.

Mitochondrial function in physically active elders with sarcopenia.

Waters, D. L., Mullins, P. G., Qualls, C. R., Raj, D. S., Gasparovic, C. & Baumgartner, R. N., 1 May 2009, In: *Mechanisms of Ageing and Development*. 130, 5, p. 315-319

The Role of Resilience and Purpose in Life in Habituation to Heat and Cold Pain.

Smith, B. W., Tooley, E. M., Montague, E. Q., Robinson, A. E., Cosper, C. J. & Mullins, P. G., 1 May 2009, In: *Journal of Pain*. 10, 5, p. 493-500

Habituation and sensitization to heat and cold pain in women with fibromyalgia and healthy controls.

Smith, B. W., Tooley, E. M., Montague, E. Q., Robinson, A. E., Cosper, C. J. & Mullins, P. G., 1 Dec 2008, In: *Pain*. 140, 3 , p. 420-428

Comparative reliability of proton spectroscopy techniques designed to improve detection of J-coupled metabolites.

Mullins, P. G., Chen, H., Xu, J., Caprihan, A. & Gasparovic, C., 1 Oct 2008, In: *Magnetic Resonance in Medicine*. 60, 4, p. 964-969

Magnetic resonance imaging of an embalmed head.

Mullins, P. G., Delieu, J. M., John, N., Mahon, M., Mullins, P., Derricott, H. & Lim, I. S., 1 Jan 2008.

Proton echo-planar spectroscopic imaging of J-coupled resonances in human brain at 3 and 4 Tesla.

Posse, S., Otazo, R., Caprihan, A., Bustillo, J., Chen, H., Henry, P. G., Marjanska, M., Gasparovic, C., Zuo, C., Magnotta, V., Mueller, B., Mullins, P. G., Renshaw, P., Ugurbil, K., Lim, K. O. & Alger, J. R., 1 Aug 2007, In: *Magnetic Resonance in Medicine*. 58, 2, p. 236-244

4Tesla proton-magnetic resonance spectroscopy (¹H-MRS) longitudinal study of early schizophrenia: Effects on N-acetyl aspartate and glutamate

Bustillo, J. R., Rowland, L., Chen, H., Mullins, P. & John, L., Dec 2006, In: *Neuropsychopharmacology*. 31, p. S178-S179

Use of tissue water as a concentration reference for proton spectroscopic imaging

Gasparovic, C., Song, T., Devier, D., Bockholt, H. J., Caprihan, A., Mullins, P. G., Posse, S., Jung, R. E. & Morrison, L. A. , 1 Jun 2006, In: *Magnetic Resonance in Medicine*. 55, 6, p. 1219-1226

A novel technique to study the brain's response to pain: Proton magnetic resonance spectroscopy.

Mullins, P. G., Rowland, L. M., Jung, R. E. & Sibbitt, W. L., 1 Jun 2005, In: *Neuroimage*. 26, 2, p. 642-646

Effects of ketamine on anterior cingulate glutamate metabolism in healthy humans: A 4-T proton MRS study.

Rowland, L. M., Bustillo, J. R., Mullins, P. G., Jung, R. E., Lenroot, R., Landgraf, E., Barrow, R., Yeo, R., Lauriello, J. & Brooks, W. M., 1 Feb 2005, In: *American Journal of Psychiatry*. 162, 2, p. 394-396

Small shifts in craniotomy position in the lateral fluid percussion injury model are associated with differential lesion development

Vink, R., Mullins, P. G., Temple, M. D., Bao, W. & Faden, A. I., 8 Jul 2004, In: *Journal of Neurotrauma*. 18, 8, p. 839-47 9 p.

Closed-head minimal traumatic brain injury produces long-term cognitive deficits in mice

Zohar, O., Schreiber, S., Getslev, V., Schwartz, J. P., Mullins, P. G. & Pick, C. G., 10 Apr 2003, In: *Neuroscience*. 118, 4, p. 949-55 7 p.

Neuroprotective and nootropic actions of a novel cyclized dipeptide after controlled cortical impact injury in mice

Mullins, P. G., Faden, A. I., Fox, G. B., Di, X., Knoblauch, S. M., Cernak, I., Mullins, P., Nikolaeva, M. & Kozikowski, A. P., 1 Mar 2003, In: *Journal of Cerebral Blood Flow and Metabolism*. 23, 3, p. 355-363

Neurochemistry in Chronic Schizophrenia: A 4t-Proton Magnetic Resonance Spectroscopy Study

Mullins, P. G., Rowland, L., Mullins, P., Jung, R., Lenroot, R., Lauriello, J., Brooks, W. & Bustillo, J., 1 Jan 2003, In: *Schizophrenia Research*. 60, 1, p. 245

Ischaemic preconditioning in the rat brain: a longitudinal magnetic resonance imaging (MRI) study

Mullins, P. G., Reid, D. G., Hockings, P. D., Hadingham, S. J., Campbell, C. A., Chalk, J. B. & Doddrell, D. M., May 2001, In: *NMR in biomedicine*. 14, 3, p. 204-209 6 p.

Presence of DNA fragmentation and lack of neuroprotective effect in DFF45 knockout mice subjected to traumatic brain injury

Yakovlev, A. G., Di, X., Movsesyan, V., Mullins, P. G., Wang, G., Boulares, H., Zhang, J., Xu, M. & Faden, A. I., Mar 2001, In: *Biomarkers in Medicine*. 7, 3, p. 205-16 12 p.

Selective blockade of the mGluR1 receptor reduces traumatic neuronal injury in vitro and improves outcome after brain trauma

Faden, A. I., O'Leary, D. M., Fan, L., Bao, W., Mullins, P. G. & Movsesyan, V., Feb 2001, In: *Experimental Neurology*. 167, 2, p. 435-44 10 p.

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