# CURRICULUM VITAE


## Gareth Brian Miles, PhD

Senior Lecturer, **School of Psychology and Neuroscience**, University of St Andrews, Fife, UK

Co-director of **Institute of Behavioural and Neural Sciences (IBANS)**, University of St Andrews

Partner member of **Euan MacDonald Centre for Motor Neurone Disease Research**, University of Edinburgh, UK

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Lab website: http://ncm.wp.st-andrews.ac.uk/ ; Twitter: @NCMlab


### DEGREES CONFERRED

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|---|---|
| 2003 | Doctor of Philosophy (Neurophysiology), University of Auckland, New Zealand |
| 1999 | Bachelor of Animal Technology (1st class Honours), University of Auckland, New Zealand |

### RESEARCH EXPERIENCE / EMPLOYMENT HISTORY

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|---|---|
| 2012 - | **Senior Lecturer**, School of Psychology & Neuroscience, University of St Andrews, Fife, UK |
| 2011 - 2012 | **Senior Lecturer**, School of Biology, University of St Andrews, Fife, UK |
| 2007 - 2011 | **Lecturer**, School of Biology, University of St Andrews, Fife, UK |
| 2003 - 2006 | **Post doctoral research fellow**, Department of Anatomy and Neurobiology, Dalhousie University, Halifax, NS, Canada |
| 1999 - 2003 | **PhD student**, Physiology Department, University of Auckland, New Zealand. |

### PRIZES AND AWARDS

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| 2010 | University of St Andrews Student's Association Teaching Award (Best Project Supervisor in the Faculty of Science) |
| 2003 - 2006 | New Zealand Foundation for Research Science and Technology Post Doctoral Fellowship ($72,500 NZD/year) |
| 2003 | Appeared on the University of Auckland Dean's list for Ph.D. theses |
| 2003 | Physiological Society of New Zealand John Hubbard Memorial Prize for Excellence in Studies towards a PhD |
| 2000 - 2002 | New Zealand Foundation for Research Science and Technology Bright Future, Top Achiever, Doctoral Scholarship |
| 1999, 2002 | University of Auckland Doctoral Scholarship |
| 1999 | Physiological Society of New Zealand Mary Bullivant Prize for Best Student Presentation |
| 1999 | Undergraduate senior scholar award in Animal Technology |

### GRANTS AWARDED

*Project grants:*

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| 2013 – 2017 | NC3Rs CRACK IT Challenge DRGNET (sponsored by Pfizer Neusentis and Grünenthal), Phase 1 (2013-14) and Phase 2 (2014-17) "Legal, ethical, clinical, and scientific validation of a system for the harvest, transport, storage, and culture of human dorsal root ganglion neurons for in vitro pain studies", with Andrew Hart, University of Glasgow/NHS and Mathis Riehle, University of Glasgow (Phase 1, £189,997 [£22,545 to St Andrews]; Phase 2, £749,99 [£66,381 to St Andrews) |
| 2011 – 2014 | The Wellcome Trust "Nitric Oxide signalling and the modulation of mammalian spinal motor networks" (£317,779) * |

2008 – 2011 Medical Research Scotland "An investigation of cholinergic synapses on motoneurons in Amyotrophic Lateral Sclerosis (ALS): a 'synaptic stripping' hypothesis for ALS" (£149,823) *

2007 – 2011 BBSRC UK "A characterisation of last order interneurons of the rodent spinal cord with specific focus on their roles in the control of locomotor activity" (£352,190) *

2007 – 2009 Project A.L.S. "Genetic and physiological analysis of cholinergic synapses on motoneurons: a 'synaptic stripping' hypothesis for ALS", with Prof Thomas Jessell, Columbia University, NYC, USA and Prof Robert Brownstone, Dalhousie University, Halifax, Canada, ($196,304 USD) *

2001 Neurological Foundation of New Zealand Project Grant. "Comparison of human motoneurons differentially sensitive to degeneration in ALS", with Dr Gregory Funk and Dr Louise Nicholson, University of Auckland, NZ ($109,521 NZD)

*Studentship grants:*

2015 – 2018 Motor Neurone Disease Association PhD Studentship award "Deciphering mechanisms underlying the dysfunction of motoneurons derived from ALS patient iPSCs" (£87,347) *

2013 – 2014 Motor Neurone Disease Association PhD Studentship award "Deciphering non-cell autonomous disease mechanisms in human ALS using inducible pluripotent stem (iPS) cell technology" , student Anna-Claire Devlin (£40,769) *

2012 – 2015 Wellcome Trust Institutional Strategic Support Funding for PhD studentship "Glial cell involvement in neural networks: cheering from the side-lines or part of the team?", student David Acton (£60,000) *

2011 – 2014 SULSA BioSKAPE Industry PhD Studentship award, with Prof Verity Brown and Hugh Marston (TPP Global Ltd.), student Ana Garcia Aguirre

2011 – 2014 Scottish Motor Neurone Disease Association, PhD studentship award "TGF-β2 - a target to enhance nerve-muscle signalling in motor neurone disease", with Dr Guy Bewick, University of Aberdeen, student Jayne Reid (£82,883)

2009 Wellcome Trust Value in People Award (University of St Andrews administered) "Purinergic signalling and the regulation of mammalian spinal locomotor networks." (£4000) *

2008 – 2011 Scottish Motor Neurone Disease Association, PhD studentship award "Metabotropic glutamate receptors and the pathogenesis of ALS", student Noboru Iwagaki (£51,090) *

2007 Wellcome Trust Value in People Award (University of St Andrews administered) "Nitric Oxide (NO) signalling and the regulation of mammalian spinal locomotor networks" (£9486) *

*Outreach grants:*

2013 The Wellcome Trust "Walking without a Brain" interactive display at *Wonder Street Fair* (7/4/13-9/4/13; ~5000 visitors) Barbican Centre, London (£419) *

**[* = GBM Primary Investigator]**

## PUBLICATIONS

[*total papers 22, total citations 749, h-index 12; Scopus, May 2015*]

*2015:*

A.C. Devlin, K. Burr, S. Borooah, J. D. Foster, E. M. Cleary, I. Geti, L. Vallier, C. E. Shaw, S. Chandran and **G. B. Miles** (2015). Human iPSC-derived motoneurons harbouring TARDBP or C9ORF72 ALS mutations are dysfunctional despite maintaining viability. *Nature Communications,* 6:5999 doi:10.1038/ncomms6999.

*2014:*

J.D. Foster, C. Dunford, K.T. Sillar, **G.B. Miles** (2014). Nitric Oxide-Mediated Modulation of the Murine Locomotor Network. *Journal of Neurophysiology*, 111:659-74.

E.C. Witts, L. Zagoraiou, **G.B. Miles** (2014). Anatomy and function of cholinergic, C-bouton, inputs to motoneurons. *Journal of Anatomy,* 224:52-60.

*2013:*

M. Antkowiak, M.L. Torres, **G.B. Miles**, E.C. Witts, K. Dholakia, F.J. Gunn-Moore (2013). Fast targeted gene transfection and optogenetic modification of single neurons using femtosecond laser irradiation. *Scientific Report,* 3, 3281, 8p.

*2012:*

L.R. Herron and **G.B. Miles** (2012). Gender -specific perturbations in modulatory inputs to motoneurons in a mouse model of Amyotrophic Lateral Sclerosis. *Neuroscience*, 226:313–323.

E. C. Witts, K. M. Panetta, **G. B. Miles** (2012). Glial-derived adenosine modulates spinal motor networks in mice. *Journal of Neurophysiology,* 107(7):1925-34.

*2011:*

**G.B. Miles** and K.T. Sillar (2011). Neuromodulation of vertebrate locomotor control networks. *Physiology*, 26:(6) 393-411.

N. Iwagaki and **G.B. Miles** (2011). Activation of group I metabotropic glutamate receptors modulates locomotor-related motoneuron output in mice. *Journal of Neurophysiology*, 105(5): 2108-20.
* highlighted as "of special interest" in: "Neuromodulation and flexibility in Central Pattern Generator Networks." R. Harris-Warrick, *Curr. Opin. Neurobiol.*, 2011, 21:685-692.

*2009:*

L. Zagoraiou, T. Akay, J.F. Martin, R.M. Brownstone, T.M. Jessell, **G.B. Miles** (2009). A cluster of cholinergic pre-motor interneurons modulates mouse locomotor activity. *Neuron*, 64(5): 645-662.
* Featured on cover of issue and in preview article: "A New Class of Spinal Interneurons: The Origin and Function of C Boutons Is Solved" E. Frank, 64(5): 593-595, 2009.

*2008:*

D.C. Yohn, **G.B. Miles**, V.F. Rafuse, R.M. Brownstone (2008). Transplanted mouse embryonic stem cell-derived motoneurons form functional motor units and reduce muscle atrophy. *Journal of Neuroscience*, 28(47): 12409-12418.
* Article featured in the "This Week in the Journal" editorial section.

K. Mukhida, M. Hong, **G.B. Miles**, T. Phillips, B.A. Baghbaderani, M. McLeod, N. Kobayashi, A. Sen, L.A. Behie, R. M. Brownstone, I. Mendez (2008). A multitarget basal ganglia dopaminergic and GABAergic transplantation strategy enhances behavioural recovery in parkinsonian rats. *Brain*, 131: 2106-2126.

*2007:*

**G.B. Miles**, R. Hartley, A.J. Todd, R.M. Brownstone (2007). Spinal cholinergic interneurons regulate the excitability of motoneurons during locomotion. *Proceedings of the National Academy of Sciences of the United States of America*, 104(7): 2448-2453.
* Faculty of 1000 Biology evaluation: "Must Read" article (Serge Rossignol: Faculty of 1000 Biology, 11 Mar 2008 http://www.f1000biology.com/article/id/1103254/evaluation).

*2006:*

L. Ma, H. Ostrovsky, **G.B. Miles**, J. Lipski, G.D. Funk, L.F.B. Nicholson (2006). Differential expression of Group I metabotropic glutamate receptors in human motoneurons at low and high risk of degeneration in ALS. *Neuroscience,* 143(1): 95-104.

P. Soundararajan, **G.B. Miles**, L.L. Rubin, R.M. Brownstone, V.F. Rafuse (2006). Motoneurons derived from embryonic stem cells express transcription factors and develop phenotypes characteristic of medial motor column neurons. *Journal of Neuroscience*, 26(12): 3256-3268.
* Article featured in the "This Week in the Journal" editorial section.

*2005:*

**G.B. Miles**, Y. Dai, R.M. Brownstone (2005). Mechanisms underlying the early phase of spike frequency adaptation in mouse spinal motoneurons. *Journal of Physiology (London)*, 566(2): 519-532.

T. Adachi, D.M. Robinson, **G.B. Miles**, G.D. Funk (2005). Noradrenergic modulation of XII motoneuron inspiratory activity does not involve {alpha}2 receptor inhibition of the Ih current or presynaptic glutamate release. *Journal of Applied Physiology*, 98(4): 1297-308.

*2004:*

**G.B. Miles**, D.C. Yohn, H. Wichterle, T.M. Jessell, V.F. Rafuse, R.M. Brownstone (2004). Functional properties of motoneurons derived from mouse embryonic stem cells. *Journal of Neuroscience*, 24(36): 7848-58.

**G.B. Miles**, J. Lipski, A.R. Lorier, P. Laslo, G.D. Funk (2004). Differential expression of voltage-activated calcium channels in III and XII motoneurones during development in the rat. *European Journal of Neuroscience,* 20(4): 903-913.

*2002:*

**G.B. Miles**, M.A. Parkis, J. Lipski, G.D. Funk (2002). Modulation of phrenic motoneuron excitability by ATP: consequences for respiratory-related output in vitro. *Journal of Applied Physiology* 92(5): 1899-910.

*2001:*

P. Laslo, J. Lipski, L.F.B. Nicholson, **G.B. Miles**, G.D. Funk (2001). GluR2 AMPA receptor subunit expression in motoneurons at low and high risk for degeneration in Amyotrophic Lateral Sclerosis. *Experimental Neurology* 169: 461-471.

*2000:*

P. Laslo, J. Lipski, L.F.B. Nicholson, **G.B. Miles**, G.D. Funk (2000). Calcium binding proteins in motoneurons at low and high risk for degeneration in ALS. *Neuroreport* 11: 3305-3308.

G.D. Funk, M.A. Parkis, S.R. Selvaratnam, D.R. Robinson, **G.B. Miles**, K. Peebles (2000). Synaptic control of motoneuronal excitability across multiple time scales in rodents: from months to milliseconds. *Clinical and Experimental Pharmacology and Physiology* 27: 120-125.

## **INVITED TALKS** (last five years):

INVITED KEYNOTE LECTURES:

Keynote lecture "Motor Neurones and Motor Neurone Diseases" symposium in:
The Tripartite Meeting of the Anatomical Societies of UK, USA & Spain. Edinburgh (Jul 10-12, 2012).

INVITED CONFERENCE TALKS:

Banbury Meeting: "Development and Evolution of the Human Motor System in relation to ALS & FTD"
Banbury Center, Cold Spring Harbor Laboratory, NY, USA (April 14-16, 2013)
8th International Motoneuron Meeting: Motoneurons and Beyond, Sydney Australia (Jul 23-26th, 2012)
Spinal Cord Networks: Beyond the Black Box, Kananaskis, Canada (Mar 31-Apr 3, 2011).
7th International Motoneuron Meeting: Towards translational research in motoneurons, Paris (Jul 9-13, 2010).

INVITED SEMINARS:

Pfizer Neusentis, Cambridge (4/3/15).
Biomedical Research Foundation, Academy of Athens, Greece (27/10/14).
Department of Physiology, Emory University, Atlanta, USA (23/4/14).
Brambell Translational Neuroscience Seminar, University of Bristol (2/5/13).
Institute of Neuroscience and Psychology, University of Glasgow (15/12/11).

Neuroscience Seminar sponsored by the Centre for Neuroregeneration, The Euan MacDonald Centre for Motor Neurone Disease Research and the Edinburgh Centre for MS Research (19/9/11).
Institute of Medical Sciences, University of Aberdeen (10/6/11)
Department of Anatomy and Neurobiology, Dalhousie University, Halifax, Canada (7/4/11)
Department of Physiology, University of Alberta, Edmonton, Canada (5/4/11)

## RESEARCH COLLABORATIONS:

INTERNATIONAL: T. M. Jessell, Howard Hughes Medical Institute Investigator, Columbia University, New York, NYC, USA; L. Zagoraiou, Academy of Athens, Greece.

UNITED KINGDOM: S. Chandran, University of Edinburgh & Euan MacDonald Centre for Motor Neurone Disease Research; G. Bewick, University of Aberdeen; A. Hart, University of Glasgow/NHS; M. Riehle, University of Glasgow; D. Hughes, University of Glasgow; A. Todd, University of Glasgow.

ST ANDREWS: Prof K.T. Sillar; Prof Malte Gather; Dr M. Antkowiak; Prof F. Gunn-Moore; Prof K. Dholakia.

## SOCIETY/PROFESSIONAL MEMBERSHIPS

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| 2013 – present | Member of the British Neuroscience Association |
| 2009 – present | Associate Faculty Member - Faculty of 1000 Biology |
| 2007 – present | Project A.L.S. research team member |
| 2000 - present | Member of the Society for Neuroscience |
| 1999 - 2003 | Member of the Physiological Society of New Zealand |

## REFEREES

Professor Thomas M. Jessell, Columbia University, New York, NY, USA
tmj1@columbia.edu

Professor Robert M. Brownstone, Dalhousie University, Halifax, NS, Canada
rob.brownstone@dal.ca

Professor Gregory Funk, University of Alberta, AB, Canada
gf@ualberta.ca

Professor Keith T. Sillar, University of St Andrews, St Andrews, Fife, UK
kts1@st-andrews.ac.uk