University of Birmingham

Dr Michael J. Grey PhD

Reader in Motor Neuroscience

School of Sport, Exercise and Rehabilitation Sciences (/schools/sport-exercise/index.aspx)

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About

(/university/colleges/les/research-gallery/michael-grey.aspx) Dr Grey is a motor neuroscience physiologist with interests in cortical/spinal plasticity and neurorehabilitation. He uses non-invasive electrophysiology, transcranial magnetic stimulation and neuroimaging techniques to study human movement. He has a particular interest in acquired brain injury including stroke and concussion.

Feedback and office hours

Offices hours: Monday 10:00-12:00 or by appointment.

Qualifications

BSc (Physics, University of British Columbia, Canada)

MSc (Kinesiology/Biomechanics, Simon Fraser University, Canada)

PhD (Biomedical Science & Engineering, Aalborg University, Denmark)

Biography

Dr Grey is a Reader in Motor Neuroscience in the School of Sport, Exercise and Rehabilitation Sciences. He obtained his PhD in Biomedical Science and Engineering from the School of Sensory-Motor Interaction, Aalborg University, Denmark. Subsequently he has held research appointments at Aalborg University, University of Jyväskylä, Finland and, more recently, at the University of Copenhagen, Denmark where he was cross appointed in the Department of Exercise and Sport Sciences and the Department of Neuroscience and Pharmacology. Dr Grey maintains the position of Guest Researcher at the University of Copenhagen. He has enjoyed research visits in several countries, and maintains active international collaborations with researchers in Australia, Canada, Denmark and the United States.

Teaching

Dr Grey coordinates the following modules:

Sport and Exercise Sciences BSc Programme
Neuroplasticity & Neurorehabilitation (Module organiser)

Sport and Exercise Sciences MSc Programme
Neural Adaptations to Training (Module organiser)

Dr Grey contributes to the following modules:

Sport and Exercise Sciences BSc Programme
Anatomy and Biomechanics (Neuroanatomy)
Sensation and Movement (Various topics motor control)

Physiotherapy BSc Programme
Neurological Practice (Motor control)

Physiotherapy Pre-Reg MSc Programme
Developing Evidence-Based Neurological Practice (Motor control and neuroplasticity)

Medical Science BMedSc Programme
Neuroscience (Neuroplasticity)

Research

In the Neuroplasticity and Neurorehabilitation laboratory we study the physiology of human motor system. We use non-invasive techniques, including electrophysiology, transcranial magnetic stimulation and neuroimaging to investigate how the brain and spinal cord change during motor learning and rehabilitation. We are particularly interested in understanding the role played by sensory feedback and using this knowledge to develop better evidence-based rehabilitation strategies.

Publications

1: Mathias JP, Barsi GI, van de Ruit M, Grey MJ. Rapid acquisition of the transcranial magnetic stimulation stimulus response curve. Brain Stimul. 2014 Jan-Feb;7(1):59-65. doi: 10.1016/j.brs.2013.08.003. Epub 2013 Sep 3. PubMed PMID: 24120355.

2: Christensen MS, Grey MJ. Modulation of proprioceptive feedback during functional electrical stimulation: an fMRI study. Eur J Neurosci. 2013 Jun;37(11):1766-78. doi: 10.1111/ejn.12178. Epub 2013 Mar 5. PubMed PMID: 23461704.

3: Lorentzen J, Nielsen D, Holm K, Baag√∏e S, Grey MJ, Nielsen JB. Neural tension technique is no different from random passive movements in reducing spasticity in patients with traumatic brain injury. Disabil Rehabil. 2012;34(23):1978-85. Epub 2012 Mar 19. PubMed PMID: 22423894.

4: Barthelemy D, Alain S, Grey MJ, Nielsen JB, Bouyer LJ. Rapid changes in corticospinal excitability during force field adaptation of human walking. Exp Brain Res. 2012 Mar;217(1):99-115. doi: 10.1007/s00221-011-2977-4. Epub 2012 Jan 13. PubMed PMID: 22246104.

5: Lorentzen J, Grey MJ, Geertsen SS, Biering-Sorensen F, Brunton K, Gorassini M, Nielsen JB. Assessment of a portable device for the quantitative measurement of ankle joint stiffness in spastic individuals. Clin Neurophysiol. 2012 Jul;123(7):1371-82. doi: 10.1016/j.clinph.2011.11.001. Epub 2011 Nov 25. PubMed PMID: 22119175.

6: Geertsen SS, van de Ruit M, Grey MJ, Nielsen JB. Spinal inhibition of descending command to soleus motoneurons is removed prior to dorsiflexion. J Physiol. 2011 Dec 1;589(Pt 23):5819-31. doi: 10.1113/jphysiol.2011.214387. Epub 2011 Oct 10. PubMed PMID: 21986208; PubMed Central PMCID: PMC3249052.

7: Barthelemy D, Grey MJ, Nielsen JB, Bouyer L. Involvement of the corticospinal tract in the control of human gait. Prog Brain Res. 2011;192:181-97. doi:10.1016/B978-0-444-53355-5.00012-9. Review. PubMed PMID: 21763526.

8: Iftime-Nielsen SD, Christensen MS, Vingborg RJ, Sinkjaer T, Roepstorff A, Grey MJ. Interaction of electrical stimulation and voluntary hand movement in SII and the cerebellum during simulated therapeutic functional electrical stimulation in healthy adults. Hum Brain Mapp. 2012 Jan;33(1):40-9. doi: 10.1002/hbm.21191. Epub 2011 May 17. PubMed PMID: 21591025.

9: Christensen MS, Lundbye-Jensen J, Grey MJ, Vejlby AD, Belhage B, Nielsen JB. Illusory sensation of movement induced by repetitive transcranial magnetic stimulation. PLoS One. 2010 Oct 11;5(10):e13301. doi: 10.1371/journal.pone.0013301. PubMed PMID: 20948962; PubMed Central PMCID: PMC2952623.

10: Cronin NJ, af Klint R, Grey MJ, Sinkjaer T. Ultrasonography as a tool to study afferent feedback from the muscle-tendon complex during human walking. J Electromyogr Kinesiol. 2011 Apr;21(2):197-207. doi: 10.1016/j.jelekin.2010.08.004. Epub 2010 Sep 15. Review. PubMed PMID: 20833562.

11: Lorentzen J, Grey MJ, Crone C, Mazevet D, Biering-S√∏rensen F, Nielsen JB. Distinguishing active from passive components of ankle plantar flexor stiffness in stroke, spinal cord injury and multiple sclerosis. Clin Neurophysiol. 2010 Nov;121(11):1939-51. doi: 10.1016/j.clinph.2010.02.167. Epub 2010 May 10. PubMed PMID: 20457538.

12: af Klint R, Cronin NJ, Ishikawa M, Sinkjaer T, Grey MJ. Afferent contribution to locomotor muscle activity during unconstrained overground human walking: an analysis of triceps surae muscle fascicles. J Neurophysiol. 2010 Mar;103(3):1262-74. doi: 10.1152/jn.00852.2009. Epub 2009 Dec 23. PubMed PMID: 20032239.

13: Cronin NJ, Ishikawa M, Grey MJ, af Klint R, Komi PV, Avela J, Sinkjaer T, Voigt M. Mechanical and neural stretch responses of the human soleus muscle at different walking speeds. J Physiol. 2009 Jul 1;587(Pt 13):3375-82. doi: 10.1113/jphysiol.2008.162610. Epub 2009 May 18. PubMed PMID: 19451207; PubMed Central PMCID: PMC2727044.

14: Zuur AT, Christensen MS, Sinkjaer T, Grey MJ, Nielsen JB. Tibialis anterior stretch reflex in early stance is suppressed by repetitive transcranial magnetic stimulation. J Physiol. 2009 Apr 15;587(Pt 8):1669-76. doi: 10.1113/jphysiol.2009.169367. Epub 2009 Feb 23. PubMed PMID: 19237419; PubMed Central PMCID: PMC2683955.

15: Af Klint R, Nielsen JB, Sinkjaer T, Grey MJ. Sudden drop in ground support produces force-related unload response in human overground walking. J Neurophysiol. 2009 Apr;101(4):1705-12. doi: 10.1152/jn.91175.2008. Epub 2009 Jan 21. PubMed PMID: 19164100.

16: af Klint R, Nielsen JB, Cole J, Sinkjaer T, Grey MJ. Within-step modulation of leg muscle activity by afferent feedback in human walking. J Physiol. 2008 Oct 1;586(Pt 19):4643-8. doi: 10.1113/jphysiol.2008.155002. Epub 2008 Jul 31. PubMed PMID: 18669536; PubMed Central PMCID: PMC2614048.

17: Barsi GI, Popovic DB, Tarkka IM, Sinkjaer T, Grey MJ. Cortical excitability changes following grasping exercise augmented with electrical stimulation. Exp Brain Res. 2008 Oct;191(1):57-66. doi: 10.1007/s00221-008-1495-5. Epub 2008 Jul 29. PubMed PMID: 18663439.

18: Grey MJ, Klinge K, Crone C, Lorentzen J, Biering-Sorensen F, Ravnborg M, Nielsen JB. Post-activation depression of soleus stretch reflexes in healthy and spastic humans. Exp Brain Res. 2008 Feb;185(2):189-97. Epub 2007 Oct 12. PubMed PMID: 17932663.

19: Mazzaro N, Nielsen JF, Grey MJ, Sinkjaer T. Decreased contribution from afferent feedback to the soleus muscle during walking in patients with spastic stroke. J Stroke Cerebrovasc Dis. 2007 Jul-Aug;16(4):135-44. PubMed PMID: 17689409.

20: Grey MJ, Nielsen JB, Mazzaro N, Sinkjaer T. Positive force feedback in human walking. J Physiol. 2007 May 15;581(Pt 1):99-105. Epub 2007 Mar 1. PubMed PMID: 17331984; PubMed Central PMCID: PMC2075215.

21: Larsen B, Voight M, Grey MJ. Changes in the soleus stretch reflex at different pedaling frequencies and crank loads during pedaling. Motor Control. 2006 Jul;10(3):265-79. PubMed PMID: 17106134.

22: Mazzaro N, Grey MJ, do Nascimento OF, Sinkjaer T. Afferent-mediated modulation of the soleus muscle activity during the stance phase of human walking. Exp Brain Res. 2006 Sep;173(4):713-23. Epub 2006 Apr 26. PubMed PMID: 16639501.

23: Mrachacz-Kersting N, Grey MJ, Sinkjaer T. Evidence for a supraspinal contribution to the human quadriceps long-latency stretch reflex. Exp Brain Res. 2006 Jan;168(4):529-40. Epub 2005 Oct 21. PubMed PMID: 16240144.

24: Ishikawa M, Komi PV, Grey MJ, Lepola V, Bruggemann GP. Muscle-tendon interaction and elastic energy usage in human walking. J Appl Physiol (1985). 2005 Aug;99(2):603-8. Epub 2005 Apr 21. PubMed PMID: 15845776.

25: Mazzaro N, Grey MJ, Sinkjaer T, Andersen JB, Pareyson D, Schieppati M. Lack of on-going adaptations in the soleus muscle activity during walking in patients affected by large-fiber neuropathy. J Neurophysiol. 2005 Jun;93(6):3075-85. Epub 2005 Feb 2. PubMed PMID: 15689390.

26: Grey MJ, Mazzaro N, Nielsen JB, Sinkjaer T. Ankle extensor proprioceptors contribute to the enhancement of the soleus EMG during the stance phase of human walking. Can J Physiol Pharmacol. 2004 Aug-Sep;82(8-9):610-6. PubMed PMID: 15523518.

27: Mazzaro N, Grey MJ, Sinkjaer T. Contribution of afferent feedback to the soleus muscle activity during human locomotion. J Neurophysiol. 2005 Jan;93(1):167-77. Epub 2004 Sep 8. PubMed PMID: 15356177.

28: Grey MJ, van Doornik J, Sinkjaer T. Plantar flexor stretch reflex responses to whole body loading/unloading during human walking. Eur J Neurosci. 2002 Nov;16(10):2001-7. PubMed PMID: 12453064.

29: Grey MJ, Larsen B, Sinkjaer T. A task dependent change in the medium latency component of the soleus stretch reflex. Exp Brain Res. 2002 Aug;145(3):316-22. Epub 2002 Jun 14. PubMed PMID: 12136381.

30: Grey MJ, Ladouceur M, Andersen JB, Nielsen JB, Sinkjaer T. Group II muscle afferents probably contribute to the medium latency soleus stretch reflex during walking in humans. J Physiol. 2001 Aug 1;534(Pt 3):925-33. PubMed PMID: 11483721; PubMed Central PMCID: PMC2278750.

31: Grey MJ, Pierce CW, Milner TE, Sinkjaer T. Soleus stretch reflex during cycling. Motor Control. 2001 Jan;5(1):36-49. PubMed PMID: 11232549.

Expertise

Michael is happy to talk to the media about his research related to neuroplasticity, neuroplasticity, traumatic brain injury and sport-related concussion. He is available for rapid responses.

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Media experience

Michael is equally happy on radio or television. Media appearances include:

BBC Breakfast
BBC One
BBC Radio 5 Live
BBC Wales
BBC World Service
ITV Channel 4
Sky News

Michael been interviewed for national and international print media including:

Associated Press
Birmingham Mail
Daily Mail
Sports Insight Magazine
The Guardian

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