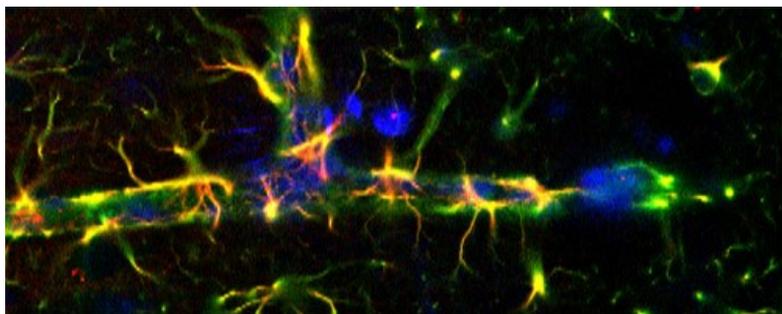


Glial Cell Biology and Remyelination Research Group



Group leader: Dr Daniel Fulton
<http://www.birmingham.ac.uk/staff/profiles/cem/NN/fulton-daniel.aspx>

Overview

Glia, including oligodendrocytes, Schwann cells, astrocytes and microglia, are the main supporting cells in the mammalian central nervous system (CNS). They perform a variety of different functions and are critical to both neuronal survival and normal function. Our research concentrates on the diverse functions of glial cells and their responses after ocular, spinal and traumatic brain injury as well as investigating their role in diseases such as glaucoma and optic neuritis.

Our research group

The long-term goal of our research group is to understand how glial cells interact with neurons and contributes to normal function, injury-mediated responses and in diseases of the CNS. Our studies have focussed on the responses of glial cells after injury in the eye, spinal cord and the brain.

For example, our work has shown that glial cell activation in the retina correlates with retinal neuronal survival and axon regeneration after optic nerve injury. This work suggests that key axon growth regulatory molecules may be secreted by retinal glia and therefore identification of these molecules will be useful in finding novel molecules to aid axon regeneration after ocular trauma.

In multiple sclerosis (MS), myelin and oligodendrocytes in the brain and spinal cord are the major targets of cell-mediated immune attacks, which results in demyelination and culminates in progressive disability and paralysis in affected patients. To add to this problem, the regenerative capacity of the mammalian CNS is very limited with neuronal repair being curtailed by a wide variety of endogenous inhibitory molecules that culminate in demyelination and eventual loss of function. Currently, MS is untreatable and disease symptoms are poorly managed by current therapies. We are therefore identifying new molecules that will aid remyelination and offer a real therapeutic advantage over currently available drugs.

Current Projects

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- Synaptic regulation of glial development and myelination- project funded by Science Cities Research Alliance Fellowship led by Dr Daniel Fulton
- Synaptic mechanisms for myelination and neuronal repair- project funded by a Marie Curie Career Integration Grant led by Dr Daniel Fulton
- Remyelination after multiple sclerosis and optic neuritis – led by Dr Zubair Ahmed

Recent Publications

- Ahmed Z., Aslam M., Lorber B., Douglas M.R., Suggate E.L., Berry M., Logan A. (2010). Optic nerve and vitreal inflammation are RGC neuroprotective but only the latter i RGC axogenic. *Neurobiology of Disease* 37: 441-454
- Paez PM, Fulton D, Spreuer V, Handley V & Campagnoni AT (2011) 'Modulation of Canonical Transient Receptor Potential Channel 1 in the Proliferation of Oligodendrocyte Precursor Cells by the Golli Products of the Myelin Basic Protein Gene' *Journal of Neuroscience* 31:3625-3637
- Fulton D, Paez P, Spreur V, Handley V, Colwell CS, Campagnoni A & Fisher R (2011) 'Developmental activation of the proteolipid protein (PLP) promoter transgene in neuronal and oligodendroglial cells of the neostriatum in mice' *Developmental Neuroscience* 33:170-184
- Fulton D, Paez PM & Campagnoni AT (2010) 'The multiple roles of myelin protein genes during the development of the oligodendrocyte' *ASN Neuro* 1(1):art:e00003
- Fulton D, Paez PM, Fisher R, Handley V, Colwell CS & Campagnoni AT (2010) 'Regulation of L-type Ca⁺⁺ Currents and process morphology in white matter oligodendrocyte precursor cells by golli-myelin proteins' *Glia* 58:1292-1303
- Kato K, Forero MG, Fenton JC, Hidalgo A (2011) The glial regenerative response to central nervous system injury is enabled by pros-notch and pros-NFκB feedback. *PLoS Biol.* 9(8):e1001133

Staff

Principal Investigators

Dr Daniel Fulton (<http://www.birmingham.ac.uk/staff/profiles/cem/NN/fulton-daniel.aspx>) - School of Clinical and Experimental Medicine

Professor Ann Logan (<http://www.birmingham.ac.uk/staff/profiles/cem/NN/Logan-Ann.aspx>) - School of Clinical and Experimental Medicine

Dr Zubair Ahmed (<http://www.birmingham.ac.uk/staff/profiles/cem/NN/Ahmed-Zubair.aspx>) - School of Clinical and Experimental Medicine

Honorary Staff

Professor Martin Berry - School of Clinical and Experimental Medicine, College of Medicine and Dentistry

Wing Commander Robert Scott - Royal Centre for Defence Medicine

Internal Collaborators

Dr Alicia Hidalgo (<http://www.birmingham.ac.uk/staff/profiles/biosciences/hidalgo-alicia.aspx>) - School of Biosciences, College of Life and Environmental Sciences