

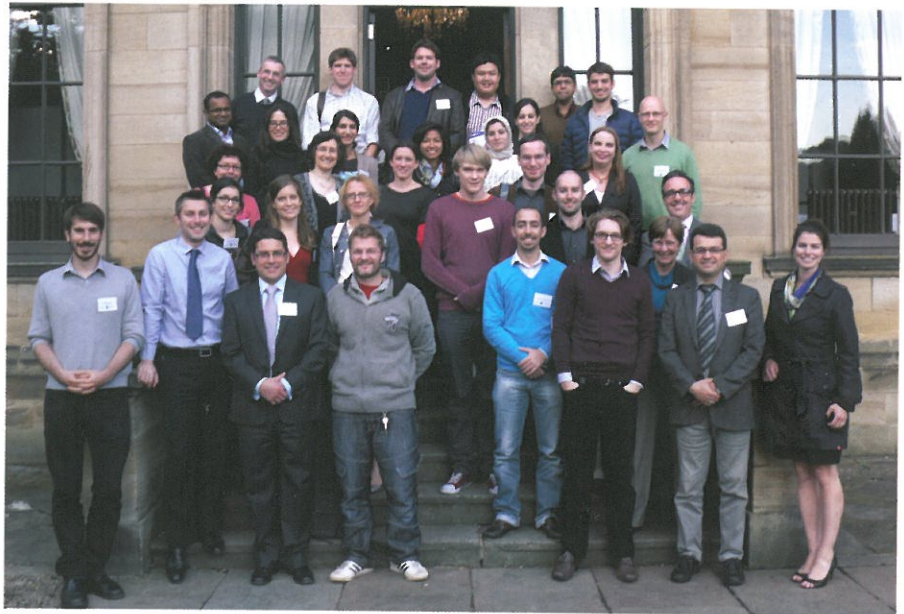
# 5th North East Epilepsy Research Meeting (NEERM V)

**Conference details:** 27th September, 2013; County Durham, UK. **Report by:** Dr Mark Baker, Institute of Neuroscience, Newcastle University & Neurology/Clinical Neurophysiology, Royal Victoria Infirmary; Dr Mark Cunningham, Institute of Neuroscience, Newcastle University and Dr Yvonne Hart, Department of Neurology, Royal Victoria Infirmary.

The fifth annual meeting of the North East Epilepsy Research Network was held recently in the serene surroundings of the 18th Century Beamish Hall. The focus of the meeting was to foster and develop the already burgeoning collaborative interactions between various basic scientists and clinicians working in the field of epilepsy in the region. The meeting, supported by the Institute of Neuroscience, Newcastle University, UCB Pharma S.A., Cyberonics, Digitimer, Eisai Ltd., Fannin, Medtronics, Nutricia and Viropharma was attended by over 70 delegates.

The first session, which was chaired by Dr Mark Baker (co-organiser), began in great style with a fascinating insight into the emerging evidence from imaging studies of cognitive dysfunction in Juvenile Myoclonic Epilepsy (JME). Presenting data from the literature and examples from his studies, Dr Rob Powell (Morriston Hospital, Swansea), revealed how structural and functional brain changes in JME may be important for assessing the severity of the epilepsy observed in this patient cohort. Continuing the theme of cognitive impairment and epilepsy Dr Tangunu Fosi (RVI, Newcastle) summarised findings from his studies with event-related potentials and MRI techniques. Dr Fosi presented data from children with West Syndrome demonstrating functional changes in temporal lobe and identifying a potential microstructural substrate for his observations.

John Osselton spent his entire academic career at Newcastle University. His contribution to the development and refinement of EEG technology is acknowledged by the universal appreciation that many neurologists, neurophysiologists and technicians, past and present, hold for his edition of the Handbook of Clinical Neurophysiology. To honour John's contributions, we dedicate an annual lecture in his memory. This year's Osselton lecture was given by Professor Matthew Walker (Queen Square/UCL) who took us on a journey describing a number of emerging treatments for epilepsy. Beginning with the writings of Hughlings Jackson, Professor Walker incorporated viruses, slime moulds and coconuts in his scientific travails. This work involved the development of novel gene therapies to alter the excitability of cortical neurons in the seizure focus. Specifically, his team conducted



lentiviral over-expression of the potassium channel Kv1.1 in neocortical pyramidal neurons. Using a model of focal epilepsy (neocortical tetanus toxin injection), both co-injection and administration of the Kv1.1 lentivirus, prevented and progressively suppressed epileptic activity, respectively. In the second portion of his lecture, Professor Walker outlined how, in collaboration with Dr Robin Williams (Royal Holloway), he has used Dictyostelium (slime mould) to screen drugs which act on the biochemical pathway that valproate also works on. The clinical use of sodium valproate is tempered by its serious side effects, crucially the drug's teratogenic action. By using the slime mould model, they have been able to identify novel antiepileptic drugs, more potent than valproate but lacking the teratogenic effect. A number of the lead compounds were identified as medium-chain fatty acids, which are found in high quantities in coconut oil. Interestingly, coconut oil is a core component of the MCT ketogenic diet, which is known to be beneficial in difficult to treat epilepsies.

Following lunch, the theme shifted to invasive and non-invasive monitoring techniques in epilepsy, with a session chaired by Dr Andrew Trevelyan (Institute of Neuroscience, Newcastle University). First up, Dr Jenny Read (Institute of Neuroscience, Newcastle University) outlined aspects of her work with

visual perception and how tests of vision may reveal subtle alterations in epilepsy as well as other neuropsychiatric disease states. This is likely to be due to the importance of cortical inhibition for physiological processes such as visual perception and their primary pathological role in epilepsy. Continuing with the theme of cortical inhibition and its contribution to epilepsy, Dr Catherine Schevon (Columbia University) presented novel approaches to seizure localisation using multielectrode array (MEA) and subdural recordings in human patients. Highlighting the false localisation qualities of traditional EEG techniques, Dr Schevon demonstrated the usefulness of MEA recordings of high gamma frequencies and neuronal firing patterns in overcoming the poor surgical outcomes in non-lesional neocortical epilepsy. This session was followed by a pharmacological interlude in which Dr Ben Whalley (Reading University) outlined the effectiveness of chemical compounds found in cannabis. There is a large amount of anecdotal evidence concerning the usefulness of cannabinoids in controlling human seizures. However, this effect has to be considered in the context of the side effects associated with cannabis use. Using rodent models of epilepsy, Dr Whalley presented data on the anti-convulsant properties of cannabidiol, a little studied chemical found in cannabis. The epileptic

animals experienced less severe seizures and lower mortality compared with animals given a placebo. The drug also had fewer side effects and was better tolerated than three of the most widely prescribed anticonvulsants.

The final session of the day, chaired by Dr Yvonne Hart (co-organiser), focused on research pertaining to epilepsy surgery. Dr Ian Schofield (Department of Clinical Neurophysiology, RVI, Newcastle) presented data on thalamic recordings undertaken during the implantation of deep brain stimulators for the treatment of refractory epilepsy in human patients. In his presentation Dr Schofield described the clinical, pre and intra-operative neurophysiological findings from a patient with severe temporal lobe epilepsy with mesial temporal sclerosis. Despite a relatively innocuous surface EEG, abnormal activity was recorded from

an electrode in the left thalamus and was inhibited by stimulation of the right thalamus. Dr Mark Cunningham (co-organiser) presented data from surgical samples obtained from patients with tumour-associated epilepsy. Dr Cunningham's research team use the ability to maintain tissue slices prepared from this material in an *in vitro* environment. This approach permits access and manipulability to interrogate neuronal microcircuits for mechanistic insights. Dr Cunningham highlighted the large body of work concerning anatomical studies in peritumoural tissue but the lack of functional data, in the form of electrophysiology, from this work. In the context of partial seizure control following tumour resection Dr Cunningham suggested that greater attempts to understand neuronal dynamics in the peritumoural zone are required for

better post-surgical outcomes. The final speaker of the day, Dr Andrew Jackson (Institute of Neuroscience, Newcastle University) outlined the work to be undertaken as part of a recently awarded grant to researchers at the Institute of Neuroscience. Termed CANDO (Controlling Abnormal Network Dynamics with Optogenetics) this project aims to develop a cortical implant that will function as a closed-loop feedback device, combining electrical recording from depth electrodes and local optogenetic stimulation. Combining unique access to human epileptic tissue, non-human primate and rodent models of epilepsy, the programme aims to achieve first-in-man trial of the device within seven years.

Following a long, but informative day, delegates retired to the bar and reflected on an enjoyable meeting. ♦