

Symposium 29: From channelopathies to synaptopathies

Theme: Neuronal, glial and cellular mechanisms

Wednesday 12th April, 13:20 – 15:00

Many neurological diseases including epilepsy, migraine and some movement disorders exhibit strong heritability; yet the underlying genes and cellular mechanisms are largely unknown. In the rare cases where inheritance is Mendelian, the genes overwhelmingly encode proteins involved in synaptic transmission: ion channels, transporters and components of the neurotransmitter vesicle cycle. Polygenic variability in synaptic proteins is likely to account for the non-Mendelian heritability of common forms of these diseases. A possible explanation for the episodic nature of many inherited disorders of ion channels (channelopathies) is that homeostatic regulation of neuron excitability and synapses partly compensates for alterations in the function of individual signalling molecules. Synaptic proteins are also the targets of clostridial toxins and of autoantibodies in neurological diseases. Finally, dysregulation of calcium channels is implicated in neurodegeneration.

The proposed symposium includes four presentations that will describe recent advances in the understanding of cellular and molecular mechanisms of neurological disorders caused by dysfunction of synaptic proteins and ion channels. These range from autoimmune and monogenic channelopathies through tetanus and Parkinson's disease. The speakers describe a wide range of complementary experimental approaches including molecular genetics, biochemistry, cellular physiology, electrophysiology, ion-channel biophysics and fluorescence imaging, applied to shed light on disease mechanisms and to identify new therapeutic targets.

Chair: Dr Kirill Volynski (University College London)

Speaker 1: Professor Dimitri Kullmann (University College London)

'Inherited and acquired presynaptic channelopathies'

Speaker 2: Dr Kinga Bercsenyi (King's College London)

'Nidogens are therapeutic targets in the prevention of tetanus'

Speaker 3: Professor Brigit Liss (Ulm University, Germany)

'Calcium modulation of D2 autoreceptors in context of Parkinson's disease'

Speaker 4: Dr Kirill Volynski (University College London)

'Activity-dependent regulation of synaptic strength and cellular mechanisms of paroxysmal neurological disorders'