MANCHESTER NEUROSCIENCE SEMINAR SERIES

FROM THE UNIVERSITY OF MANCHESTER

SARAH DORAN

This Seminar will be hosted by Dr Beatriz Bano-Otalora

TITLE: CIRCADIAN CONTROL IN THE TIMING OF SENSITIVE PERIODS DURING DROSOPHILA LARVAL NEURONAL DEVELOPMENT

During early development, the emerging CNS exhibits windows of heightened plasticity termed critical periods. During these ‘windows’, both neuron and network properties are highly susceptible to activity-dependent change which often leads to enduring alterations in both network structure and function. In normal development, critical periods are believed to ensure optimal neural circuit maturation, in response to changing and often unpredictable internal and/or external conditions. The transition from a plastic to a fixed state produces an optimal baseline of neural activity possibly with the advantage of fixing specific functional properties such that circuit maintenance can be reduced, thus conserving energy. The mechanisms underlying critical periods have not been fully explored, including the extent of their rigidity and the timing with which they occur. Using Drosophila as a model organism, neuronal activity was manipulated via blue light activation of CRY-containing neurons, during an established locomotor system critical period (17-19 hours after egg laying).

Here, I validate a previous observation that activation of CRY-neurons during embryonic neural development is sufficient to destabilise the mature larval locomotor circuit resulting in a seizure-like behaviour. However, I now extend these findings by showing that blue light exposure at 24-hour intervals is similarly sufficient to destabilise the same locomotor network in mature larvae. This shows that there are several ‘sensitive windows’ throughout larval development, occurring at 24hr intervals. These blue-light sensitive periods coincide with increased cry expression and do not occur in either cry or per null animals. The timing of these sensitive windows is, like the biological clock, temperature compensated. Thus, my data are consistent with circadian regulation of neuronal activity via multiple defined temporal plasticity windows. I show that the neuropeptide, pigment-dispersing factor, is required for the CRY-activated signalling pathway communicating these sensitive windows to the CNS.

With this work I demonstrate that not only is there a circadian rhythm like oscillation throughout larval development, but that it also coordinates sensitive windows of development that can have long lasting impact on the organism.

16•OCT•2024 | 14:00 - 15:00

Michael Smith Lecture Theatre in conjunction with
Victor Tapia Olivares

EVERYONE WELCOME

MANCHESTER NEUROSCIENCE SEMINAR SERIES

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VICTOR TAPIA OLIVARES

This Seminar will be hosted by Dr Beatriz Bano-Otalora

TITLE: DUAL ROLE OF 25-HYDROXYCHOLESTEROL IN HAEMORRHAGIC STROKE

Intracerebral haemorrhage (ICH) is the most lethal form of stroke, often resulting in severe and lasting disabilities for survivors. Two critical factors associated with ICH are neuroinflammation and cholesterol metabolism. Here, I will present our research on 25-hydroxycholesterol (25HC), a soluble metabolite that regulates both inflammation and cholesterol metabolism in the brain. Using zebrafish ICH and endothelial in vitro models, our findings suggest that 25HC may exacerbate cholesterol dysregulation in brain endothelial cells, potentially contributing to the risk of brain haemorrhage. On the contrary, studies using a mouse ICH model and phagocytosis in vitro approaches to investigate stroke resolution, have revealed that 25HC modulates the immune response to promote ICH recovery. Our future steps aim to explore which pathways regulated by 25HC could be promising therapeutic targets for ICH treatment.

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