I022 DISCOVERY OF PAIN-RELATED NEURAL NETWORK MECHANISMS

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The brain supports a dynamic network of neural activity that underlies awareness of all sensory phenomena, of which pain is a subset. Traditional analyses of pain sensory processing have focused on individual region of interest type approaches whereas researchers ask which brain regions participate in pain, irrespective of their inter-relations. Recently a more integrated analysis of brain function has emerged using Graph Theory, which models the brain as a network of isolated regions (nodes) and their synaptic connections (edges). In this talk I will explore the role of neural hubs as both loci of information flow and targets for disruption in chronic pain, and in other brain disorders. Importantly, disrupted hub topology in chronic pain gives rise to an unstable neural network that displays properties of explosive synchronization not dissimilar to other network sensitive states including cascading power grid failures and epilepsy. Using EEG and fMRI resting connectivity data, I will explore hub disruption and network synchronization in individuals with fibromyalgia, the canonical chronic pain condition thought to arise from cortical and subcortical functional dysregulation.

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