Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad - 500107

Internal Seminar

The neural basis of somatosensory modality-specificity: how the cortex distinguishes between heat, cold and mechanical percepts

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The organism is constantly surrounded by a complex, multimodal multi-sensory environment. While neural encoding of senses such as vision, olfaction and hearing has been studied extensively, much less is known about the encoding of somatic sensory stimuli, with our understanding being largely restricted to representation of tactile vibrässae inputs in the barrel cortex. In contrast, cellular representation in the cortex of somatic inputs from the rest of the body, including extremities, has not been studied. Most importantly, the neuronal codes corresponding to the distinct somatosensory modalities and how these are distinguished to generate distinct percepts in the primary cortex have not been decoded. Distinction of the nature of somatosensory environmental signals, such as diverse ranges of thermal changes, as well as mechanical inputs and an interpretation of their intensity is crucial for initiating goal-directed behavioral responses. The primary somatosensory cortex allows the delineation of diverse modalities of somatic inputs, enabling sensory guided-behavior, which is not only highly relevant in daily life, but also crucial for survival in a challenging habitat.

In this talk, we will explore and compare the nature of neural encoding of two distinct modalities of temperature sensing, namely heat and cold, and to further compare these to the representation of the mechanical modality. By studying activity patterns over large populations of neurons in the hindpaw region in the S1 cortex across layers 2/3 and 4, we will address two alternative hypotheses, namely that representation of specific modalities of somatosensory stimuli comes about via specific, hard-wired cortical ensembles with cell type-specificity or via distinct spatiotemporal patterns of activity generated within a common set of cortical neurons.

Monday, Sep 3rd 2018

4:00 PM (Tea/Coffee at 3:30 PM)

Seminar Hall, TIFR-H