



Life Sciences Seminar

Information Storage in Memory Engrams

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Over the past seven years, memory engram technology has provided an unprecedented tool for understanding specific memory representations in the rodent brain. Memory engram technology integrates immediate early gene (IEG) labelling techniques with optogenetics to facilitate the activity-dependent tagging and reversible manipulation of components of specific memory engrams. Using engram technology we can ask how learning effects the plasticity of engram cells, and conversely, how manipulation of engram cells alters memory function. Thus it is now possible to study the causal relationship between the isomorphic behavioral and physiological properties of memory in a unitary experimental preparation. In my talk, I will describe the early development of engram technology and how it enables us to label sparse populations of hippocampal cells that are both sufficient and necessary for the recall of specific contextual memories (Liu et al., 2012; Ramirez et al., 2013). I will then present our research on engram cell plasticity, in order to demonstrate how engram technology can be applied as an effective tool for progressive investigation into the neurobiology of long-term memory consolidation and amnesia (Ryan et al., 2015). I will propose a novel form of engram circuit plasticity characterized by an all or none engram-to-engram cell transynaptic connectivity, which survives retrograde amnesia, and may account for the long-term storage of learned information at an anatomical level. I will then present more recent research on the plasticity of whole engram cell intrinsic excitability as a potential mechanism of short-term memory (Pignatelli, Ryan et al., 2018). Based on this research I will discuss a working model of how learned information may be persistently stored in a distributed and hierarchical memory circuit through stable engram cell connectivity patterns (Tonegawa et al., 2015; Queenan et al., 2017). I will discuss findings from my own research group that extend these findings. In particular I will discuss unpublished data on the development of memory engrams across the lifespan, and how memory engram function may be related to the evolution of innate instincts.

Tuesday, February 18, 2020 02:00pm - 03:00pm

Mondi Seminar Room 2, Central Building



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(#142) and has the Institute Logo printed on the side.