

Virtual DANDRITE Lecture

Thursday 22 April 2021

14.00 – 15.00

Online via Zoom

Please find Zoom link via the Outlook calendar invitation. If you have not received this, please write an e-mail to Kathrine: kh@dandrite.au.dk



Kazumasa Tanaka

Assistant Professor at the Memory Research Unit,
Okinawa Institute of Science and Technology Graduate University,
Japan

Heterogeneous Memory Traces in the Hippocampus

The hippocampus supports memories for past events, but its specific role remains conjectural. The Cognitive Map Theory is strongly supported by hippocampal physiology and widely accepted in the field (O'Keefe and Nadel, 1978). In this idea, episodic memories are anchored to spatial domains, or allocentric frameworks, of experiences. The hippocampal place cells provide a stable representation of external space. On the other hand, recent studies using Immediate Early Genes (IEGs; a proxy of neuronal activation) favor the Memory Index Theory (Teyler and DiScenna, 1986). This idea posits that the hippocampal memory trace serves as an index for a cortical representation of memory and hypothesize the primary hippocampal function being to reinstate the pattern of cortical activity present during memory encoding. Although these two ideas are not mutually exclusive, it remained unclear how to reconcile them. Our recent findings provide a unitary view of these two different theories (Tanaka et al., 2018). In the hippocampal CA1 region, the activity of c-Fos expressing pyramidal neurons reliably reflects the identity of the context in an index-like fashion. However, their firing locations are highly unstable. Spikes from other active pyramidal cells stably provide spatial information over a more extended period. These two distinct ensembles of hippocampal neurons suggest heterogeneous roles of the hippocampus for memory.