Joint KJELDGAARD & DANDRITE Lecture

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Building 1593, Aud. 012 (The iNANO Auditorium),
Aarhus University

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The role of the hippocampus in spatial learning

In the hippocampus, place cells help animals to solve spatial learning tasks by preferentially representing goal locations. To investigate this role, in the past we trained animals to locate hidden food rewards on a cheeseboard maze, which led to the formation of new place maps, incorporating the location of new reward locations. During sleep periods following learning, the firing patterns of goal-encoding cells were preferentially reactivated, which also predicted the after-sleep memory performances of the animal. To causally show the involvement of goal-specific reactivation in the stabilisation of spatial memories, we have recently developed a method that involved the online identification of cell assemblies and the optogenetic disruption of a selective subgroup of them during reactivation. We trained animals to locate goals in two different environmental context (i.e. two cheeseboards at different location with different distal cues), with each associated with a different goal location. After learning we disrupted the reactivation of assemblies representing one of the goals using our online assembly detection procedure during rest/sleep. Following the disruption, we observed a selective memory impairment of the disrupted goal but not the other. Altogether, these results suggest that the reorganisation and reactivation of goal-related population firing patterns sustain spatial learning and memory retention abilities and reactivation of learned goals during sleep has a role in in the consolidation of spatial memories.

Host: Group Leader Anne von Philipsborn, Dept. of Molecular Biology and Genetics,
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