

第38回 最先端脳科学セミナー

Complementary role of hippocampal outputs circuits for episodic memory formation

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要旨

Hippocampal (HPC) network plays an essential role in episodic memory formation, with the inputs coming from superficial layers of the entorhinal cortex into the HPC providing spatial, contextual, object, and timing information (Kitamura et al., *Science* 2014, Sun et al., *PNAS* 2015, Kitamura et al., *Neuron* 2015). There is still unknown about the contribution of output circuits from hippocampal formation in episodic memory. It has been believed that episodic memories initially require rapid synaptic plasticity within the hippocampus for their formation and are gradually consolidated in neocortical networks for permanent storage. In my first topic, I will talk about the neural circuits that support neocortical memory consolidation. I present that neocortical prefrontal memory engram cells, which are critical for remote contextual fear memory, were rapidly generated during initial learning through the input from the deep layer of entorhinal cortex (Kitamura et al., *Science* 2017). In my second topic, I will talk about role of subiculum on episodic memory formation. We found dorsal subiculum and the circuit, CA1 to dorsal subiculum to medial entorhinal cortex layer 5, play a crucial role selectively in the retrieval of episodic memories (Roy et al., *Cell* 2017). Conversely, the direct CA1 to medial entorhinal cortex layer 5 circuits is essential specifically for memory formation. Our data suggest that the subiculum-containing detour loop is dedicated to meet the requirements associated with recall such as rapid memory updating and retrieval-driven instinctive fear responses.

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