

# 第43回最先端脳科学セミナー

## Adult Neurogenesis Conserves Hippocampal Memory Capacity

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### 要旨

The hippocampus is crucial for declarative memories in humans and encodes episodic and spatial memories in animals. Memory coding strengthens synaptic efficacy via an LTP like mechanism. Given that animals store memories of everyday experiences, the hippocampal circuit must have a mechanism that prevents saturation of overall synaptic weight for the preservation of learning capacity. LTD works to balance plasticity and prevent saturation. In addition, adult neurogenesis in the hippocampus is proposed to be involved in the down-scaling of synaptic efficacy. Adult neurogenesis in male rats plays a crucial role in the maintenance of hippocampal capacity for memory. Neurogenesis regulated the maintenance of LTP, with decreases and increases in neurogenesis prolonging or shortening LTP persistence, respectively. Artificial saturation of hippocampal LTP impaired memory capacity in contextual fear conditioning, which completely recovered after 14 days, which was the time required for LTP to decay to the basal level. Memory capacity gradually recovered in parallel with neurogenesis-mediated gradual decay of LTP. Ablation of neurogenesis by X-ray irradiation delayed the recovery of memory capacity, while enhancement of neurogenesis using a running wheel sped up recovery. Thus, one benefit of ongoing adult neurogenesis is the maintenance of hippocampal memory capacity through homeostatic renewing of hippocampal memory circuits. Decreased neurogenesis in aged animals may be responsible for the decline in cognitive function with age.

### Featured publication:

- ◆ Alam J, Kitamura T, Saitoh Y, Ohkawa N, Kondo T, Inokuchi K. Adult Neurogenesis Conserves Hippocampal Memory Capacity. **J. Neurosci.**, 9 July 2018, 2976-17. doi:<https://doi.org/10.1523/JNEUROSCI.2976-17.2018>

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