Cell ensemble mechanisms underlying memory formation

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Abstract

Memories are not stored in isolation from other memories but are integrated into associative networks. At the same time, each memory has its own identity. Because association of related memories, with keeping the identity of each memory, is the fundamentals of knowledge formation, it is important to understand the underlying mechanisms. In this seminar, I will show that sharing memory engram cells underlies the linkage between memories (1), while synapse-specific plasticity guarantees the identity and storage of individual memories (2). In addition, I will suggest that engram cells in the hippocampus are organized into sub-ensembles representing distinct pieces of information, which are then orchestrated to constitute an entire memory (3).

References


BIOGRAPHICAL SKETCH

1979 Graduated from Nagoya University.
1984 Ph.D degree from Nagoya University, work on gene regulation mechanisms in Escherichia coli.
1985  Researcher, Mitsubishi Kagaku Institute of Life Sciences, Tokyo, gene regulation in *Saccharomyces cerevisiae*.
1991  Postdoc in Eric Kandel lab, Columbia University in New York, memory mechanisms of *Aplysia californica*.
1993  Senior Researcher, Mitsubishi Kagaku Institute of Life Sciences, Tokyo, molecular and cellular mechanisms underlying memory formation in mice.
2009–present  Professor, University of Toyama, memory engram.

**AWARDS**

- 2010  Tokizane Memorial Award
- 2013  Prizes for Science and Technology, The Commendation for Science and Technology by the MEXT, Japan
- 2018  Toray Science and Technology Prize
- 2019  Takamine Memorial Daiichi Sankyo Award
- 2019  Naito Memorial Award for the Advancement of Science
- 2019  Medal of Honor with Purple Ribbon, Cabinet Office, Japan

**PUBLICATIONS**