

Lecture 3: Monday, July 1

Cell ensemble mechanisms underlying memory formation

Kaoru Inokuchi

Department of Biochemistry, Graduate School of Medicine &
Pharmaceutical Sciences, University of Toyama, Japan

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

1. Abdou et al, Science, 360, 1227-1231 (2017). doi:10.1126/science.aat3810
2. Yokose et al, Science, 355: 398-403 (2018). doi:10.1126/science.aal2690
3. Ghandour et al, Nature Communications, in press (2019)

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 <i>Saccharomyces cerevisiae</i> . |
| 1991 | Postdoc in Eric Kandel lab, Columbia University in New York, memory mechanisms of <i>Aplysia californica</i> . |
| 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

1. Abdou et al, Science, 360, 1227-1231 (2017). doi:10.1126/science.aat3810
2. Yokose et al, Science, 355: 398-403 (2018). doi:10.1126/science.aal2690