

第1246回生物科学セミナー

日時：12月5日(水) 15:00-16:30

演者：Hidehiko Inagaki

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演題： The neuronal mechanisms of short-term memory

Short-term memory, the ability to maintain information over times of seconds, is one of the most fundamental functions of the brain. Neurons in the frontal cortex show persistent changes in spiking activities during memory maintenance and these changes are neural correlates of short-term memories. Interestingly, individual neurons in the brain are essentially memory-less: they can maintain information only for tens of milliseconds. Thus, short-term memory is an emergent property of neuronal networks. A variety of theoretical models have been proposed to resolve this gap in time scales between individual neurons and neuronal networks, yet the mechanisms of short-term memory remain unsolved. We systematically investigated the mechanism underlying persistent spiking activity in mouse frontal cortex, combining intracellular and extracellular electrophysiology with optogenetic perturbations and network modeling. Our results support a model in which discrete attractor dynamics underlie short-term memory. I will further discuss my long-term goal to develop a mechanistic understanding of how internal brain states, such as thirst, hunger and the internal clock, modify dynamics in the frontal cortex to influence cognitive functions.

参考文献

Inagaki HK, Fontolan L, Romani S, Svoboda K. (2017) Discrete attractor dynamics underlying selective persistent activity in frontal cortex. *bioRxiv*. 203448; doi: <https://doi.org/10.1101/203448>

Inagaki HK, Inagaki M, Romani S, Svoboda K. (2018) Low-dimensional and monotonic preparatory activity in mouse anterior lateral motor cortex. *Journal of Neuroscience*. 3152-17.

Guo ZV*, **Inagaki HK***, (*equal contribution) Daie K, Druckmann S, Gerfen CR, Svoboda K. (2017) Maintenance of persistent activity in a frontal thalamocortical loop. *Nature (Article)*. 545: 181-186.

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