

OIST SEMINAR

Date: Monday, March 6, 2017

Time: 15:00 – 16:00

Venue: Lab 1, Meeting Room C016 (Level C)

Speaker: Teruhiro Okuyama, Ph.D.

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Title: “Manipulation of Social memory stored in the hippocampus”

Abstract:

For social animals, it is crucial to remember and recognize different conspecific individuals (social memory), in order to exhibit the appropriate social behaviors, such as the approach or avoidance behavior, towards each individual. However, it remains unknown which parts of these brain regions and their circuits hold social memory. In humans, lesion of the hippocampus leads to multiple memory deficits including social memory. This suggests that the hippocampus, at least in part, stores memory information on the individual as well as other components of episodic memory such as spatial or temporal information. In rodents, the literature has not reached a consensus regarding the role of the hippocampus in social memory formation. Some studies using lesion experiments or electrophysiological recording concluded that the hippocampus is dispensable for recognizing a familiar conspecific, whereas other studies suggested the contrary.

Since mice naturally tend to spend more time interacting with novel mice, as compared to familiar mice (social discrimination behavior), we can quantify the degree of memory of individuals by calculating the total duration of time spent with novel versus familiar individuals. Using this behavioral assay, we found that ventral hippocampal CA1 (vCA1) neurons of a mouse and their projections to nucleus accumbens (NAc) shell play a necessary and sufficient role in social memory. Both the proportion of activated vCA1 cells and the strength and stability of the responding cells are greater in response to a familiar mouse than to a novel mouse. Optogenetic reactivation of vCA1 neurons that respond to the familiar mouse enabled memory retrieval and the association of these neurons with the unconditioned stimuli. Thus, vCA1 neurons and their NAc shell projections are a component of the storage site of social memory. Our research gives us new insights into the neural mechanisms underlying social memory and social familiarity.

References:

Okuyama et al., *Science* 353: 1536–1541 (2016).

Okuyama et al., *Science* 343: 91–94 (2014).