CDB SEMINAR

Hisashi Umemori

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Tuesday, June 27

16:00~17:00 C1F CDB Auditorium

Finding the Synaptic Organizers

Summary

Neurons analyze and transmit information in our nervous system. Information is transferred from one neuron to another at functional contact sites called synapses. Precise assembly of synapses is critical for proper functioning of the nervous system.

Synapses are formed by signaling between the presynaptic and postsynaptic cells. Postsynaptic cell-derived “presynaptic organizers” promote local differentiation of axons into functional nerve terminals at sites of synaptic contact.

We purified and identified such presynaptic organizers using clustering of synaptic vesicles in cultured neurons as an assay, and examined their in vivo function using mouse mutants. We show that:
(1) In the cerebellum, FGF22 is a critical presynaptic organizer (Umemori et al., Cell 118, 257, 2004).
(2) At the Neuromuscular junction, multiple muscle-derived cues act sequentially to organize presynaptic differentiation, with FGF7/10/22, laminin β2, and collagen IV playing predominant roles in induction, maturation, and maintenance of functional motor nerve terminals, respectively.

These results help explain how synapses are specifically organized in our nervous system.

Speaker Profile

Dr. Hisashi Umemori’s research has focused on how synapses form in the nervous system. Working with Joshua R. Sanes at Harvard University, he successfully identified FGF22 as a curial signal physiologically required in recruiting synaptic vesicles to the axon terminal (synaptic organizer). Currently an Assistant Professor at the University of Michigan Medical School, Ann Arbor, Dr. Umemori continues to focus on the molecular mechanisms underlying synapse formation and maturation.

References: FGF22 and its close relatives are presynaptic organizing molecules in the mammalian brain. *Cell* (2004) 118:257-270
Seeking long-term relationship: axon and target communicate to organize synaptic differentiation. *Journal of Neurochemistry* (2006) 97: 1215-1231

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