第50回 最先端脳科学セミナー

Cell-type-specific patterned activities specify gene expression patterns for olfactory circuit formation.

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要 旨

The development of precise neural circuits is initially directed by genetic programming and subsequently refined by electrical neural activity. The most prevailing model for the activity-dependent development of neural circuits postulates the interaction between pre- and post-synaptic neurons. In Hebbian plasticity, the correlated activity of pre- and post-synaptic neurons strengthens synaptic connections, whereas uncorrelated or lack of activity weakens them. However, the olfactory map develops even in mutant mice lacking synaptic partners, suggesting another activity-dependent mechanism for the olfactory map formation. During development, axons from various olfactory neurons expressing the same olfactory receptor (OR) segregate into specific glomeruli in an activity-dependent manner. we found that OSNs exhibited OR-specific temporal patterns of spontaneous activities. Moreover, differing patterns of neuronal activity induced different expression patterns of axon-sorting molecules that regulate glomerular segregation. We propose an activity-dependent mechanism that is fundamentally different from the Hebbian plasticity theory in which cell-type-specific patterned activity contributes to generating the combinatorial code of axon-sorting molecules for the olfactory map refinement.

Reference

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