

Behavioral state-dependent change in the information processing modes in the central olfactory system

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【Outline of survey】

Behavioral states (such as sleep state or satiety state) play key roles for the control of sensory information flow in the brain. The first aim of the present study is to analyze the change in the information processing modes at different states of vigilance (sleep and awake) in the central olfactory system using electrophysiological and optical imaging methods. We focus on olfactory bulb – olfactory cortex – entorhinal cortex – hippocampus pathways and olfaction-guided food finding behavior. Because olfaction and taste depend on the state of hunger or satiety, we speculate that the information processing modes in the central olfactory system may change according to the change in the hunger or satiety state. We focus on the olfactory bulb – olfactory cortex – amygdala pathway and olfactory bulb – olfactory cortex – insular cortex pathway, and analyze the manner of information processing at different hunger or satiety states.

【Expected results】

Although the function of the central sensory systems depends heavily on the internal states of the brain, it is not well understood how the internal states switch the signal processing modes. Through the understanding the state dependent-switchover of the olfactory signal processing modes in the central olfactory pathways, we expect that the present study will lead to better understandings of neuronal mechanisms of sleep, awakening, hunger and satiety in the fields of sensory physiology and neuroscience. In addition, we expect the advance in the basic knowledge for the relation between olfaction and taste with food intake.

【References by the principal researcher】

- Murakami, M. et al., (2005) State-dependent sensory gating in olfactory cortex. *Neuron* 46:285-296.
- Mori, K., et al., (2006) Maps of odorant molecular features in the mammalian olfactory bulb. *Physiological Reviews* 86:409-433.

【Term of project】 FY2006 - 2010

【Budget allocation】 17,800,000 yen

【Homepage address】

<http://morilab.m.u-tokyo.ac.jp/eindex.html>