

**Molecular mechanisms for recognition and signal transduction
of sex-specific peptides in the mouse vomeronasal organ**

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【Outline of survey】

The detection of chemicals in the external environment – so called, chemosensation - is essential for the survival in many animals. Odorants – volatile ‘smellable’ chemicals – and pheromones – species and gender-specific chemicals – are two major olfactory cues by which information about food and suitable mating partners is transmitted. Social and reproductive behaviors in mammals are modulated by not only volatile pheromones but also non-volatile cues that are likely detected by vomeronasal sensory neurons. We identified a male-specific peptide that was encoded by a gene from a previously-unrecognized large family in mice. This peptide, named ESP1, is secreted in tears of male mice and transferred to the female vomeronasal organ wherein it elicits an electrical response. In this study, we aim to understand molecular mechanisms underlying recognition and signal transduction of ESP1 in the mouse vomeronasal system. We will identify a receptor for ESP1 and visualize a neural circuit that transmits the ESP1 signal to the brain. We will reveal behavioral and neuroendocrinological effects of ESP1 and understand how mice utilize peptide pheromones in sociosexual communication.

【Expected results】

The current study will reveal function of the vomeronasal organ and how the vomeronasal neuronal circuit is constructed to perceive pheromone molecules. We can understand how each animal has acquired a unique strategy to transmit volatile or non-volatile sex-specific cues by adopting their environment during the processes of evolution. In addition to these basic scientific aspects, the results may be applied to a strategy that allows us to control the number of wild mice that have produced many significant troubles in cities.

【References】

- Kimoto, H., Haga, S., Sato, K., and Touhara, K.* "Sex-specific peptides from exocrine glands stimulate mouse vomeronasal sensory neurons" Nature 437, 898-901 (2005)
- Kimoto, H., Sato, K., Nodari, F., Haga, S., Holy, T., and Touhara, K.* "Sex- and strain-specific expression and vomeronasal activity of mouse ESP family peptides" Current Biology in press (2007)

【Term of project】 FY2007 - 2011

【Budget allocation】 4,400,000 yen

(2007 direct cost)

【Homepage address】

<http://park.itc.u-tokyo.ac.jp/molecular-recognition/touhara/kyukaku.html>