

## Department of Allergology

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### General Summary

The Department of Allergology was established in 2011. Our research concerns the biological significance of immunoglobulin E (IgE) and mechanisms of protection against parasites.

### Research Activities

#### *Protection against reinfection with *Vampirolepis nana* eggs*

*Vampirolepis nana*, the dwarf tapeworm, infects humans around the world and also infects mice. Oral infection with eggs of *V. nana* induces strong protection against reinfection with eggs through innate immunity in mice. The protection was observed 1 day after priming infection and had been completed after 2 days, when no challenge worms were detected in the intestine. No protection against oral reinfection was found in mice primed with eggs in the skin or the peritoneal cavity, indicating that priming in the intestine was essential. To examine the specificity of protection, mice infected with 3 species of intestinal nematodes were challenged with *V. nana* eggs. Each nematode infection partially protected against *V. nana* infection, suggesting that the mechanism of protection is likely to be different from that of *V. nana*. Cells responsible for protection were CD4+ T cells, but not natural killer cells, natural killer T cells, basophils, or CD8+ cells. Costimulatory signals were required from inducible T-cell costimulator ligand (ICOSL) but not from CD80 or CD86. These results suggest a novel innate immune system in the intestine for protection against *V. nana*.

#### *Protection by an IgE-level regulatory gene*

We have previously reported an IgE-level regulatory gene that causes mice to be IgE high-responders and low-responders. When IgE high-responder mice were infected with *Trichinella spiralis*, and their IgE function was artificially interfered, the protective activity against *T. spiralis* was reduced. However, no reduction in protective activity was found in IgE low-responder mice. These results indicate that an IgE-level regulatory gene controls protection against *T. spiralis* and suggest that a biological role of IgE is protection against parasites.

### Publications

**Watanabe N.** Impaired protection against *Trichinella spiralis* in mice with high levels of IgE. *Parasitol Int.* 2014; **63**: 332-6. Epub 2013 Dec 15.  
**Obata-Ninomiya K<sup>1</sup>, Ishiwata K, Tsutsui H<sup>1</sup>, Nei Y<sup>1</sup>, Yoshioka S<sup>1</sup>, Kawano Y<sup>1</sup>, Minegishi Y<sup>1</sup>,**

**Ohta N<sup>1</sup>, Watanabe N, Kanuka H, Karasuyama H<sup>1</sup> (<sup>1</sup>Tokyo Med Dent Univ).** The skin is an important bulwark of acquired immunity against intestinal helminths. *J Exp Med.* 2013; **210**: 2583-95.

### Reviews and Books

**Yokoyama Y, Kanuka H, Watanabe N, Asano K.** A method for in vivo cultivation of dwarf tape-

worm, *Hymenolepis nana* (in Japanese). In: Asakawa M, editor. Parasitology research, materials and method 2013. Nagoya: Sankeisha; 2013. p. 61-5.