Institute of DNA Medicine
Department of Molecular Immunology

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General Summary

Our research has focused on analysis of the basic immune system to protect us from diseases and of immune disorders, such as hypersensitivity diseases and autoimmune diseases.

Research Activities

Interleukin 31 increases serum IgE levels in mice

Interleukin (IL)-31 transgenic mice that we have established show higher serum IgE levels than do their nontransgenic littermates. To confirm the association of IL-31 with serum IgE levels observed in the transgenic mice, recombinant (r) murine IL-31 was administered to normal C57BL/6 and BALB/c mice and to IL-4 receptor α-deficient knock-out mice. Serum IgE levels of mice were measured with a 2-site capture assay. To investigate the production of IL-4, IL-5, IL-13, and interferon γ, spleen cells from mice were cultured for 5 days, after which culture supernatants were harvested and tested for cytokine activity by means of sandwich enzyme-linked immunosorbent assay. Serum IgE levels of C57BL/6 and BALB/c mice that received injections of rIL-31 were significantly higher than those of mice treated with phosphate-buffered saline (PBS). However, no significant increase in serum IgE levels was observed in IL-4 receptor α-deficient knock-out mice that received injections of IL-31. Furthermore, production of IL-13 and IL-5 was significantly higher in the rIL-31-treated C57BL/6 mice than in PBS-treated control mice. In contrast, no significant difference in interferon γ production activity was found between rIL-31-treated mice and PBS-treated mice, whereas the concentration of IL-4 was below the detectable level in both groups. These results suggest that IL-31 is involved in the enhancement of serum IgE levels via induction of IL-13 expression.

Decreased numbers of CD4+ and CD8+ cells containing signal-joint T-cell receptor excision circles in patients with systemic lupus erythematosus

Patients with systemic lupus erythematosus (SLE) have decreased numbers of peripheral blood T cells containing signal-joint T cell receptor excision circles (Sj TRECs), which are considered an indicator of thymic output. The objective of this study was to investigate the mechanism of the decrease in such T cells. Peripheral blood T cells from patients with SLE were classified as CD4+ or CD8+ cells. Levels of Sj TREC were measured with the real-time polymerase chain reaction. Telomerase activity was determined with the telomeric repeat amplification protocol assay. The numbers of

CD4+ and CD8+ cells containing Sj TREC in the peripheral blood were lower in patients with SLE than in control subjects. A correlation was found between the number of Sj TREC-positive CD4+ cells and the number of CD8+ cells. The Sj TREC level is influenced by an increase in cell division. To examine this increase, telomerase activity, as an indicator of cell division, was measured simultaneously; however, there was no correlation between the Sj TREC level and telomerase activity. These results suggest that thymic output is decreased in patients with SLE.

Tenascin-C is required for proliferation of astrocytes in primary culture

Astrocytes in primary culture can be classified morphologically into 2 types: fibrous astrocytes and protoplasmic astrocytes. To examine the role of tenascin-C in an *in-vitro* astrocyte culture, primary cultures of astrocytes prepared from the brains of wild-type and of tenascin-C-deficient embryonic mice were analyzed. In primary culture of astrocytes from tenascin-C-deficient mice, fibrous astrocytes did not appear, and astrocytes did not become tile-shaped when they came in contact with each other. The rate of 5-bromo-2′-deoxyuridine incorporation in a cell proliferation assay was much lower for astrocytes from tenascin-C–deficient mice than for astrocytes from wild-type mice. These results suggest that tenascin-C is an essential molecule for maintaining the proliferation and proper morphology of astrocytes in primary culture.

Publications

Kurosaka D, Yasuda J, Ikeshima-Kataoka H, Ozawa Y, Yoshida K, Yasuda C, Kingetsu I, Saito S, Yamada A. Decreased numbers of signal-joint t cell receptor excision circle-containing CD4+ and CD8+ cells in systemic lupus erythematosus patients. *Mod Rheumatol* 2007; **17:** 296–300.

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Ikeshima-Kataoka H, Saito S, Yuasa S. Tenascin-C is required for proliferation of astrocytes in primary culture. *In Vivo* 2007; **21:** 629–33.