

# Abstract

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## **Biotin status affects nickel allergy via regulation of interleukin-1beta production in mice.**

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**BACKGROUND:** Biotin, a water-soluble B complex vitamin, is possibly involved in chronic inflammatory diseases, although the detailed mechanisms are unclear.

**OBJECTIVE AND METHODS:** In this study, we investigated the effects of biotin status on nickel (Ni) allergy in mice. Mice were fed a basal or biotin-deficient (BD) diet for 8 wk and sensitized with an intraperitoneal injection of NiCl<sub>2</sub> and lipopolysaccharide. Ten days after sensitization, NiCl<sub>2</sub> was intradermally injected into pinnae and ear swelling was measured. For in vitro analysis, we cultured a murine macrophage cell line, J774.1, under a biotin-sufficient (C, meaning control) or BD condition for 4 wk and analyzed interleukin (IL)-1 production.

**RESULTS:** Significantly higher ear swelling was induced in BD mice than C mice. Adoptive transfer of splenocytes from both C and BD mice induced Ni allergy in unsensitized mice. Regardless of donor mice, ear swelling was significantly higher in BD recipient mice than C recipient mice. Ni allergy was not induced in either C or BD IL-1(-/-) mice. Splenocytes from BD mice produced a significantly higher amount of IL-1beta than those from C mice. Production and mRNA expression of IL-1beta were significantly higher in BD J774.1 cells than in C cells. Biotin supplementation inhibited the augmentation of IL-1beta production in vitro. In vivo supplementation of biotin in drinking water dose-dependently decreased ear swelling in C and BD mice.

**CONCLUSION:** These results indicate that biotin status affects Ni allergy in the elicitation phase via the upregulation of IL-1beta production in mice, suggesting that biotin supplementation may have therapeutic effects on human metal allergy.

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