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Effects of vitamin A deficiency on mucosal immunity and response to intestinal infection in rats.

Yang Y¹, Yuan Y, Tao Y, Wang W.

 Author information

¹Children's Hospital, Pediatrics Department, Fudan University, Shanghai, China.

Abstract

OBJECTIVE: Vitamin A deficiency is associated with an increased incidence of infectious respiratory and alimentary tract diseases in children, and vitamin A supplementation can prevent and assist in treating these diseases. To clarify the mechanisms of these associations, we investigated the effects of vitamin A deficiency on mucosal immunity to intestinal infection in rats.

METHODS: Specific pathogen-free Sprague-Dawley rats received a vitamin A-free diet, with (n=20) or without (n=20) vitamin A supplementation. Intestinal infection was induced by oral inoculation of salmonella in 10 rats in each group. The rats were killed 3 d after infection was induced, and we measured the number, maturation, and activation of dendritic cells; the expression of Toll-like receptors 2 and 4; mRNA level of myeloid differentiation primary response gene (88) (MyD88, pattern-recognition receptors and their adapter protein); immune cytokine production in the intestinal mucosa; and the amount of secretory immunoglobulin A in the gut.

RESULTS: In vitamin-A deficient rats, the number of mucosal dendritic cells and the production of IL-12 markedly increased; the mucosal expressions of Toll-like receptor 2 and MyD88 were up-regulated, and secretions of interferon- γ and secretory immunoglobulin A were decreased. Infection aggravated the damage to the intestinal mucosa and lowered immunity in vitamin-A deficient rats.

CONCLUSION: Vitamin A deficiency damaged both humoral and cellular immunity in the mucosa. Modulation of dendritic cells is likely an important mechanism through which vitamin A deficiency affects mucosal immune responses against infection.

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