Effects of dietary arginine supplementation on antibody production and antioxidant enzyme activity in burned mice

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Abstract

This study investigated the effect of arginine (Arg) supplementation on specific antibody production and antioxidant enzyme activities in burned mice vaccinated with detoxified Pseudomonas exotoxin A linked with the outer membrane proteins I and F, named PEIF. Also, the survival rate of burned mice complicated with Pseudomonas aeruginosa was evaluated. Experiment 1: Thirty BALB/c mice were assigned to two groups. One group was fed a control diet with casein as the protein source, while the other group was supplemented with 2% Arg in addition to casein. The two groups were isonitrogenous. The mice were immunized twice with PEIF, and the production of specific antibodies against PEIF was measured every week. After 8 weeks, all mice received a 30% body surface area burn injury. Mice were sacrificed 24h after the burn. The antioxidant enzyme activities and lipid peroxides in the tissues as well as the specific antibody production were analyzed. Experiment 2: Twenty-eight mice were divided into two groups and vaccinated as described in experiment 1. After the burn the mice were infected with P. aeruginosa, and the survival rate was observed for 8 days. The results demonstrated that antioxidant enzyme activities and lipid peroxides in tissues were significantly lower in the Arg group than in the control group after the burn. The production of specific antibodies against P. aeruginosa significantly increased in the Arg group at 4 and 7 weeks after immunization, and 24h after the burn. The survival rates of vaccinated burned mice after bacterial infection did not significantly differ between the two groups. These results suggest that vaccinating mice with Arg supplementation may enhance humoral immunity and attenuate the oxidative stress induced by burn injury. However, Arg supplementation did not improve survival in vaccinated mice complicated with P. aeruginosa infection.