

Effects of dietary glutamine on antioxidant enzyme activity and immune response in burned mice

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Abstract

Objectives

We investigated the effect of dietary glutamine (Gln) 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 (PEIF). We also evaluated the survival rate of vaccinated and non-vaccinated burned mice infected with *Pseudomonas aeruginosa*.

Methods

There were three consecutive experiments. In experiment 1, 30 BALB/c mice were assigned to one of two groups. The control group was fed casein as the protein source; the Gln group received 4% Gln (w/w) to replace part of the casein. Mice were immunized twice with PEIF, and the production of specific antibodies against PEIF was measured every week. Eight weeks after immunization, all mice received a 30% body surface area burn injury. Mice were killed 24 h after the burn. The antioxidant enzyme activities and lipid peroxides in the tissues and specific antibody production were analyzed. In experiment 2, 12 mice were assigned to a control or a Gln group and fed with one of the experimental diets for 4 wk. Then burn injury was induced, and mice were killed 24 h later. *In vitro*, splenocytes were cultured, and interleukin (IL)-4 and IL-10 were measured after mitogen stimulation. In experiment 3, survival rates of vaccinated and non-vaccinated burned mice complicated with *P. aeruginosa* infection were evaluated. The survival rate was observed for 8 d after the burn.

Results

Antioxidant enzyme activities and lipid peroxides in tissues tended to be lower in the Gln group than in the control group after the burn. Specific antibody production against *P. aeruginosa* increased significantly in the Gln group at 4 and 7 wk after immunization and at 24 h after the burn. IL-4 concentrations in mitogen-stimulated splenocytes were significantly higher in the Gln group than in the control group. Survival rates of non-vaccinated burned mice in the Gln group were significantly higher than those in the control group, whereas there was no difference in the survival of vaccinated burned mice after bacterial infection.

Conclusions

These results suggested that vaccinated mice receiving a Gln-enriched diet may have enhanced humoral immunity and attenuated oxidative stress induced by burn injury. Also, Gln supplementation improved the survival of burned mice complicated with *P. aeruginosa* infection.