Arginine Supplementation Enhances Peritoneal Macrophage Phagocytic Activity in Rats with Gut-derived Sepsis

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The aim of this study was to examine the effect of Arginine-supplemented diets before or/and after Arginine-enriched total parenteral nutrition (TPN) solution after sepsis on the phagocytic activity of peritoneal macrophages and blood polymorphonuclear cells in rats with gut-derived sepsis. Male Wistar rats were assigned to 4 groups. Group 1 and 2 fed with semipurified diet, group 3 and 4 replaced part of casein with 2% of total calorie as Arg. After feeding the experimental diets for 10 days, sepsis was induced by cecal ligation and puncture (CLP), at the same time internal jugular vein was cannulated. All rats were maintained with TPN for 3 days. Group 1 and 3 were infused conventional TPN, while group 2 and 4 supplemented with Arg, replacing 10% of total amino acid in TPN solution. The survival rates were recorded for 3 days after CLP, and all survival rats were sacrificed 3 days after CLP to examine their immune responses. The results demonstrated that aerobic and anaerobic bacteria colony counts in peritoneal lavage fluid (PLF) were significantly reduced, and phagocytic activity of peritoneal macrophage was enhanced in the group 3 and 4 but not in the other two groups. There were no significant differences in the phagocytic activities of blood polymorphonuclear cells among the 4 groups. The survival rate tended to be higher in the group 4, however no significant difference was observed among the all groups. These results suggest that enteral Arg supplementation before sepsis significantly enhances peritoneal macrophage phagocytic activity and reduces total bacteria number in PLF. Arg administered before and after CLP seemed to have synergistic effect on enhancing phagocytic activity, and bacterial clearance. However, intravenous Arg administration after CLP had no favorable effects on phagocytic activity or survival rates in rats with gut-derived sepsis.

Keywords: sepsis, arginine, macrophage, phagocytosis

Effects Of Glutamine Supplementation on Antioxidant Enzyme Activity and Immune Responses In Burned Mice

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This study investigated the effect of glutamine (Gln) 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 (PEIF). Also, the survival rate of non-vaccinated burned mice infected with *Pseudomonas aeruginosa* (*P. aeruginosa)* was evaluated. This study consisted 3 consecutive experiments. Experiment 1: Thirty BALB/c mice were assigned to 2 groups. Control group fed with casein as the protein source; Gln group was supplemented with 4% Gln (w/w) to replace part of casein. The 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 sacrificed 24h after the burn. The antioxidant enzyme activities and lipid peroxides in the tissues as well as specific antibody production were analyzed. Experiment 2: Twelve mice were divided into the control and the Gln groups, and fed with one of the 2 experimental diets for 4 weeks. Then burn injury was induced and mice were sacrificed 24h later. In vitro, splenocyte was cultured and interleukin (IL)-4,IL-10 were measured after mitogen stimulation. Experiment 3: Survival rates of non-vaccinated burned mice complicated with *P. aeruginosa* infection were evaluated. Survival rate was observed for 8 days after the burn. The results demonstrated that 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 weeks after immunization, and at 24 h after the burn. IL-4 concentrations in the mitogen stimulated splenocyte was significantly higher in the Gln group than the control group. Survival rates of non-vaccinated burned mice in the Gln group were significantly higher than the control group after bacterial infection between the 2 groups. These results suggest that vaccinated mice receiving Gln supplemented diet may enhance humoral immunity and attenuate oxidative stress induced by burn injury. Also, Gln supplementation improves survival of burned mice complicated with *P. aeruginosa* infection.

Key words: Burns, Glutamine, Antioxidant enzyme activity, Antibody, vaccination, *P.*

aeruginosa.