Effects of ω-3 fatty acids on inflammatory mediators and splenocyte cytokine mRNA expressions in rats with polymicrobial sepsis

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Abstract

Objectives: Many studies have shown that ω-3 fatty acids (FAs) have immunomodulatory effects. However, the influence of w-3 FAs on septic conditions is not certain. This study examined the effect of fish oil (FO)-enriched diets before and/or ω-3 FA-containing total parenteral nutrition (TPN) after sepsis on the distribution of T-lymphocyte subpopulations and splenocyte cytokine mRNA expressions in rats with polymicrobial sepsis. Methods: Rats were assigned to a control group and four experimental groups. The control group and groups 1 and 2 were fed a semipurified diet, and groups 3 and 4 had 20% soybean oil replaced by FO. After feeding the diets for 10 d, sepsis was induced by cecal ligation and puncture (CLP) in the experimental groups, whereas sham operation was performed on the control group. TPN was maintained for 3 d after CLP or sham operation. The control group and groups 1 and 3 were infused with conventional TPN, whereas the TPN solution of groups 2 and 4 was supplemented with FO. All rats were sacrificed 3 d after the operation to examine their immune responses. Results: Messenger RNA expressions of interleukin-2 and tumor necrosis factor-a in splenocytes were higher in groups 3 and 4 than in the control group and group 1. Interleukin-10 mRNA expression in group 3 was higher than in the control group and group 2. Blood CD4 percentage and CD4/CD8 ratio in group 1 were significantly lower, whereas no differences were observed in FO-supplemented groups compared with the control group. Conclusion: FO administration before and/or after CLP maintained blood T-lymphocyte subpopulations and modulated T-helper type 1 and 2 cytokine mRNA expressions in rats with polymicrobial sepsis.