Effects of parenteral infusion with medium-chain triglycerides and safflower oil emulsions on hepatic lipids, plasma amino acids and inflammatory mediators in septic rats

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Abstract

This study was designed to investigate the effects of preinfusion with total parenteral nutrition (TPN) using medium-chain triglycerides (MCT) versus safflower oil (SO) emulsion as fat sources on hepatic lipids, plasma amino acid profiles, and inflammatory-related mediators in septic rats. Normal rats, with internal jugular catheters, were divided into two groups and received TPN. TPN provided 300kcal/kg/day with 40% of the non-protein energy provided as fat. All TPN solutions were isonitrogenous and identical in nutrient composition except for the fat emulsion, which was made of SO or a mixture of MCT and soybean oil (9:1) (MO). After receiving TPN for 6 days, each group of rats was further divided into control and sepsis subgroups. Sepsis was induced by cecal ligation and puncture, whereas control rats received sham operation. All rats were classified into four groups as follows: MCT control group (MOC, n= 8), MCT sepsis group (MOS, n= 8), safflower oil control group (SOC, n= 8), and safflower oil sepsis group (SOS, n= 11). The results of the study demonstrated that the MOS group had lower hepatic lipids than did the SOS group. Plasma leucine and isoleucine levels were significantly lower in the SOS than in the SOC group, but no differences in these two amino acids were observed between the MOC and MOS groups. Plasma arginine levels were significantly lower in septic groups than in those without sepsis despite whether MCT or safflower oil was infused. Plasma glutamine and alanine levels, however, did not differ between septic and non-septic groups either in the SO or MO groups. No differences in interleukin-1b, interleukin-6, tumor necrosis factor-α, and leukotriene B4concentrations in peritoneal lavage fluid were observed between the two septic groups. These results suggest that catabolic reaction is septic rats preinfused MCT is not as obvious as those preinfused safflower oil. Compared with safflower oil, TPN with MCT administration has better effects on reducing sepsis-induced liver fat deposition. Preinfusion with MCT before sepsis, however, had no effect on inflammatory-related cytokines or leukotriene in peritoneal lavage fluid. In addition,

plasma arginine appears to be a more sensitive indicator than glutamine for septic insult.