麩醯胺對腹膜炎引致敗血症老鼠之腸道及全身性免疫反應之影響

Effects of Glutamine on Systemic and Mucosal Immunity in Rats with Gut-derived Sepsis

中文摘要

本實驗在敗血症前以由口進食，敗血症後以全靜脈營養(total parenteral nutrition, TPN)輸入方式給與 glutamine(Gln)，來探討 Gln 對敗血症時腸道及全身性免疫反應之影響。實驗以 Wistar 雄性老鼠爲實驗對象，共分爲五組，control 組及第一、二組給予自行調配一般組成之 semipurified diet，其餘兩組給予相同形式並以 Gln 取代總氮量之 25%。各給予十天後，除 control 組沒做盲腸結紮及穿刺手術(cecal ligation and puncture, CLP)外，其餘四組均實行 CLP 手術以引致腹膜炎及敗血症，同時進行頸靜脈插管手術。手術後 control 組與第一、三組在敗血症後輸入一般之 TPN 輸液，剩下之兩組輸入以 Gln 取代總氮量 25%之 TPN 輸液，故五組中有一組爲正常控制組，不做 CLP 但作頸靜脈插管手術，手術前後均給一般配方。其餘四組均施行 CLP 及頸靜脈插管手術，分別爲：（1）CLP 前後均給一般配方(-/-)（2）CLP 前給一般飲食，CLP 後給富含 Gln 之 TPN 輸液 (-/+)（3）CLP 前給富含 Gln 之飲食，手術後給一般之 TPN 輸液(+/-)（4） CLP 前後均給富含 Gln 之配方(+/+)。五組之營養素組成、總熱量以及總氮量均相等。在引致敗血症三天後犧牲老鼠，取腹水，收集腹腔巨噬細胞，由腹腔動脈收集血液樣本，並取下小腸、脾臟供分析之用。研究結果顯示，與敗血症之控制組（-/-）相較，敗血症發生前(+/-)或後(-/+)給予 Gln 之補充均可以維持血漿中 Gln 之濃度，維持全血、脾臟、Peyer’s patches 內 Total T 及 helper T 淋巴細胞之分佈，血漿中免疫球蛋白 A 之濃度並增加脾臟細胞內細胞激素 mRNA 之表現量。敗血症發生前(+/-)補充 Gln 可促進腹腔巨噬細胞吞噬能力，而敗血症發生後(-/+)補充 Gln 會增加小腸免疫球蛋白 A 之分泌量。於敗血症發生前後皆添加 Gln(+/+)對上述所有測定之免疫指標均有正面之效應。但 Gln 添加對降低血中細胞激素濃度及增加白血球吞噬能力並無影響。

英文摘要

This study investigated the effect of Gln-enriched diets before and Gln-containing total parenteral nutrition (TPN) after sepsis or both on mucosal and systemic immunity in rats with gut-derived sepsis. Male Wistar rats were assigned to the control and 4 experimental groups. The control and groups 1 and 2 were fed a semipurified diet, while groups 3 and 4 had part of the casein replaced with 25% of total nitrogen as Gln. After feeding the diets for 10 d, sepsis was induced by cecal ligation and puncture (CLP), whereas the control group underwent sham operation; at the same time, an internal jugular vein was cannulated. All rats were maintained on

TPN for 3 d. The control and groups 1 and 3 were infused with conventional TPN, while groups 2 and 4 were supplemented with Gln, replacing 25% of total nitrogen in the TPN solution. The TPN solutions were isonitrogenous and identical in nutrient composition except for the difference in the amino acid content. There were 5 groups of rats in this study: the control group, Gln not supplemented before or after the sham operation; group 1, Gln not supplemented before or after CLP (-/-); group 2, a semipurified diet given before and Gln-containing TPN after CLP (-/+); group 3, a Gln-enriched diet given before and conventional TPN after CLP (+/-); and group 4, a Gln-enriched diet given before and Gln-containing TPN after CLP (+/+). All rats were sacrificed 3 d after the sham operation or CLP to examine their immune responses. The results demonstrated that compared with group 1, Gln supplementation before or after CLP maintained plasma Gln levels, preserved total T and helper T lymphocytes in whole blood, splenocytes and Peyer’s patches. Also, plasma immunoglobulin A levels and splenic cytokines mRNA expression were increased in these 2 groups. Gln-enriched diets before CLP significantly enhanced peritoneal phagocytic activity, whereas Gln-containing TPN after CLP promoted intestinal immunoglobulin A secretion. Gln supplementation both before and after CLP seemed to have a synergistic effect on all the immune parameters mentioned above. However, Gln had no favorable effects on reducing plasma cytokine concentration, and the effect of Gln on phagocytic cells in the systemic circulation was not obvious in rats with gut-derived sepsis.