

全靜脈營養添加麩醯胺或精胺酸對切胃手術老鼠異化作用及免疫反應之影響

Effects of parenterally infused glutamine or arginine on nutrient metabolism and immune response in rats with gastrectomy

中文摘要

本研究之目的在探討全靜脈營養(TPN)液中添加 Glutamine (GLN)或 Arginine(Arg)對切胃手術老鼠體內同化性荷爾蒙分泌,以及對體內的異化作用和免疫反應之影響。

本實驗使用 230-250 gm 之雄性 Wistar 老鼠,實驗共分為兩大部分。實驗一)將老鼠分為 GLN 組及 Control 組,進行頸靜脈插管手術給予 TPN,TPN 溶液之熱量濃度為 1 kcal/mL,氮供應量為 6.84g/L,氮與熱量的比為 1:145,GLN 組 GLN 之添加量為 8.4 g/L。在實驗期第四天後犧牲第一批老鼠,在實驗期第五天進行部分胃切除手術,切胃後 24 及 72 小時各再犧牲一批老鼠,取其血液、腹腔沖洗液(PLF)、肝臟、腎臟、脾臟、肺臟及術後三天的尿液作分析。實驗二)分為 Arg 組及 Control 組,Arg 之添加量為 5 g/L,其餘 TPN 熱量濃度、總氮量及實驗流程均與實驗一相同。實驗一之結果顯示在氮平衡方面,GLN 組在術後一天及二天之負氮平衡皆顯著較 Control 輕微。在同化性荷爾蒙方面,GLN 組在術後一天血漿中 insulin 及 insulin like growth factor-I (IGF-I) 之濃度均顯著高於 Control 組。體內免疫反應方面,GLN 組術後一天 PLF 中巨噬細胞吞噬能力顯著高於 Control 組。血漿、腹腔沖洗液及脾臟細胞刺激後細胞激素 interleukin(IL)-1 與 IL-6 之分泌量,GLN 組及 Control 組在各時間點皆無差異,而腹腔沖洗液中 tumor necrosis factor(TNF)- α 濃度則是 Control 組在術後三天顯著高於 GLN 組。實驗二之結果顯示,添加 Arg 組之氮平衡及同化性荷爾蒙之分泌和 Control 組無顯著差異。脾臟細胞刺激後之細胞激素分泌量,Arg 組術後一天之 IL-1 β 濃度顯著高於 Control 組,術後三天時 Control 組之 TNF- α 濃度顯著高於 Arg 組。在抗氧化能力方面,術後一天肝臟中之過氧化物 MDA 濃度,Control 組顯著高於 Arg 組。由以上結果顯示 TPN 中添加 GLN 可以增加術後 insulin 及 IGF-I 之濃度,進而促進體內的氮平衡,並可促進巨噬細胞之吞噬能力,或可降低術後感染之機會。而 TPN 溶液中添加 Arg,可減少腹腔內 TNF- α 之分泌,促進脾臟細胞之免疫反應,降低肝中過氧化物之生成,但對腹腔巨噬細胞及血中白血球之吞噬能力並無作用,對術後氮平衡之影響也不明顯。

英文摘要

This study investigated the effects of parenterally infused glutamine (GLN) or arginine (Arg) on hormone secretion, nutrient metabolism and immune response in

rats with gastroectomy. Male Wistar rats weighting 230-250 g were used in this study. Experiment 1: rats with internal jugular catheters were assigned to GLN and Control groups. Both groups received isonitrogenous total parenteral nutrition (TPN) with 6.84g nitrogen/L. The calorie density of the TPN solution is 1 kcal/mL, and the ratio of nitrogen/calorie is 1:145. The glutamine group replaced 25% of the total amino acid nitrogen as GLN. After receiving TPN for 3 days, one third of the rats in each experimental group were sacrificed as baseline group, after then the remaining rats underwent partial gastrectomy and were sacrificed 24 and 72 h, respectively, after surgery. Plasma, peritoneal lavage fluid (PLF), organs and urine samples were collected for further analysis. Experiment 2: Rats were assigned to Arg and Control groups. The Arg content in the Arg group replaced 23% of the amino acid nitrogen in TPN solution. The experimental procedure was identical with the experiment 1. The results of experiment 1 showed that compared with Control group, GLN group had lower nitrogen loss at 1st and 2nd d after surgery, also, higher plasma insulin and insulin like growth factor- I concentration at 1st postoperative day were observed. The phagocytic activity of peritoneal macrophage is higher in GLN group than Control group 1 day after surgery. No significant differences of IL-1 β , IL-6 levels in plasma, PLF and stimulated splenocyte were observed among the groups at various time schedule. The TNF- α concentration in PLF is higher in Control group than GLN group 3 d after surgery. Experiment 2 showed that there were no significant differences in nitrogen balance and plasma hormone concentrations between the 2 groups at each time point. The IL-1 β secreted by splenocyte was higher in the Arg group 1 d after surgery, whereas TNF- α concentration is higher in Control group 3 d after surgery. Malondialdehyde concentration in liver is higher in the Control group than the Arg group 1 d after surgery. These findings suggest that TPN supplemented with GLN enhanced phagocytic activity of peritoneal macrophage. Also, plasma insulin and IGF-I concentration were increased, which may consequently improve nitrogen balance after surgery. We observed that Arg supplementation reduced the secretion of TNF- α in PLF, and the peroxidation products in liver were also decreased. However, Arg administration had no effect on peritoneal macrophage and blood neutrophil phagocytic activity, and the effect of Arg on improving nitrogen balance was not obvious.