

Effect of glutamine on cell adhesion molecule expression and leukocyte transmigration in endothelial cells stimulated by preeclamptic plasma

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Abstract

This study investigated the effect of glutamine (GLN) concentration on surface molecule expression on endothelial cells (ECs) and leukocytes and the transendothelial migration of polymorphonuclear neutrophils (PMNs) through ECs stimulated by plasma or peritoneal drain fluid (PDF) from a surgical patient.

Human umbilical vein ECs (HUVECs) and PMNs from normal subjects were treated with different concentrations (0, 300, 600, and 1000 $\mu\text{mol/L}$) of GLN for 24 h. After that, HUVECs were stimulated for 3 h with plasma or PDF from a patient who had undergone abdominal surgery, and PMNs were allowed to transmigrate through ECs for 2 h. HUVEC surface expression of cell adhesion molecules and integrin (CD11b) and interleukin (IL) 8 receptor expression on PMNs were measured by flow cytometry. PMNs transmigrating through ECs were also analyzed. The results showed that cell adhesion molecule and integrin expressions in PDF groups were higher than those in control groups. Among the PDF groups, cellular adhesion molecule expressions on ECs and CD11b expression on PMNs were lower with 600 and 1000 $\mu\text{mol/L}$ than with 300 $\mu\text{mol/L}$ GLN. IL-8 secretions from ECs and PMNs were higher with 300 and 600 $\mu\text{mol/L}$ than with 1000 $\mu\text{mol/L}$ GLN, and this was consistent with the expression of the IL-8 receptor on PMNs. PMN transmigration was significantly higher with 300 $\mu\text{mol/L}$ GLN than with the other GLN concentrations. HUVECs stimulated by plasma from surgical patient had the similar effects on surface molecule expression as PDF; however, the influences were not so obvious as shown in PDF stimulation. The results of this in vitro study suggest that ECs and PMNs were activated after patient's plasma or PDF stimulation. A low GLN concentration comparable to catabolic conditions resulted in higher adhesion molecule expression and greater transendothelial migration of neutrophils. GLN administration at levels similar to or higher than physiological concentrations reduced IL-8 and adhesion molecule expression, and PMN transmigration was also

decreased after stimulation with plasma or PDF from a surgical patient.