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Plasma protein supplements modulate the activation of gut-associated immune system induced by *Staphylococcus aureus* enterotoxin B in rats

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Supplementation of diets with plasma protein has been shown to prevent the activation of lymphocyte populations of Peyer's patches and mesenteric lymph nodes⁽¹⁾ and improve the intestinal epithelial barrier function in a rat model of intestinal inflammation⁽²⁾. The present study investigated the effects of porcine plasma proteins (SDAP) and Ig concentrate (IC) supplements on diffuse gut-associated lymphoid tissue in a model of mild intestinal inflammation. The different populations of lamina propria and intraepithelial lymphocytes, as well as mucosal expression of cytokines (interferon- γ (IFN- γ), TNF α , IL-6 and IL-10) and pro-inflammatory mediators (inducible NO synthase (iNOS) and leukotriene B₄ (LTB₄)), were investigated. Wistar-Lewis rats were fed diets supplemented with SDAP (80 g/kg; *n* 9), IC (15 g/kg; *n* 9) or milk proteins (control die; *n* 9) from weaning (day 21) to day 33 or 34 after birth. On days 30 and 33 rats were administered *S. aureus* enterotoxin B (SEB; 0.5 mg/kg). Experimental groups were control, SEB, SEB-SDAP and SEB-IC. Lymphocyte populations were analysed by immunohistochemistry on day 34 (i.e. 24 h after SEB administration). The markers used were: CD3 (T lymphocytes), CD25 (activated T lymphocytes), CD4 (T-helper lymphocytes), CD8 (T-suppressor/cytotoxic lymphocytes), TCR $\gamma\delta$ (T- $\gamma\delta$ lymphocytes) and NKPR1A (NK cells). Cytokines were determined by a cytometric bead array assay, LTB₄ by commercial ELISA and iNOS by real-time PCR in mucosal homogenates, all at 6 h after SEB administration.

In both lamina propria and epithelium compartments SEB increased the lymphocyte cytotoxic populations (T- $\gamma\delta$ 40% and 70%; NK cells 60% and 75% respectively, all $P < 0.05$) and doubled the number of activated T lymphocytes ($P < 0.001$). Both SDAP and IC prevented the SEB effects on the lamina propria, while in the epithelium only SDAP reduced the extent of T-cell activation ($P < 0.05$). SEB increased mucosal iNOS expression by 28% ($P < 0.05$) and both plasma protein supplements prevented SEB effects on iNOS expression in the intestinal mucosa (both $P < 0.05$).

In the mucosa SEB doubled IFN- γ and LTB₄ concentrations and increased TNF α and IL-6 concentrations by 20–30%; $P < 0.05$). SDAP partially prevented these effects on IFN- γ , IL-6 and LTB₄ ($P < 0.05$). IC was also effective in reducing the expression of TNF α and LTB₄ in the mucosa ($P < 0.05$). It is concluded that dietary supplementation with plasma proteins can attenuate the intestinal inflammatory effects induced by SEB.

1. Pérez-Bosque A, Pelegrí C, Vicario M *et al.* (2004) *J Nutr* **134**, 2667–2672.

2. Pérez-Bosque A, Amat C, Polo J, Campbell JM, Crenshaw J, Russell L & Moretó M (2006) *J Nutr* **136**, 2838–2843.