INFLUENCE OF PROBIOTICS ON CYTOKINE PRODUCTION IN THE IN VITRO AND IN VIVO SYSTEMS

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Abstract. Modulatory effects of three probiotic bacterial strains (*Lactobacillus rhamnosus* GT15 (Lr), *Bifidobacterium longum* GT15 (Bl), *Enterococcus faecium* L-3 (Ef) on expression level and contents of key cytokines were studied using PCR techniques with reverse transcription, and enzyme-linked immunosorbent assay. Both cell cultures and an experimental model of intestinal dysbiosis were used in this study.

The genes encoding bacteriocins, surface membrane component, pili and exopolysaccharides involved in host immune system modulation were previously identified in the Bl and Ef bacterial strains.

Investigation of probiotic strains and effects of their supernatants expression of cytokines in cell cultures of promonocyte origin (HTP-1) showed increased expression of TNF α , due to Bl, Ef and Lr supernate. Moreover, the Bl culture induced IL-8 and IL-10 expression.

In a model of Wistar rats with ampicillin- and metronidazole-induced intestinal dysbiosis corrected with probiotics we have shown that the dysbiosis was accompanied by sufficient alterations in microbiota composition (*Klebsiella spp.* overgrowth and low contents of *Faecalobacterium prausnitzii*) that were observed only in the animals untreated with probiotics (control), or after administration of Lr.

In contrast to these results, the animals treated with Ef and Bl, the following changes were revealed: 1) low expression of proinflammatory cytokines IL-8, TNF α , MCP-1 in mesenteric lymph nodes and appropriate changes of their serum contents, 2) increased serum content of the anti-inflammatory TGF- β cytokine. Hence, the present study, having used two complementary models, has detected some individual features of immune modulation produced by the probiotictic strains of *L. rhamnosus* GT15, *B. longum* GT15 n *E. faecium* L-3 which exert differential effects upon the intestinal microbiota.

Keywords: Lactobacilli, Bifidobacteria, Enterococci, dysbiosis, cytokines