

Probiotics and prebiotics and food intolerance

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Probiotics

Probiotics are viable microbial feed supplements which beneficially influence the health of the host animal (1). Adhesion to intestinal surfaces is considered a prerequisite for effective probiotic bacterial strains. *Lacto-bacillus* strains such *L. GG*, *L. acidophilus LA1*, *L. acidophilus NCFB 1748*, *L. casei Shirota*, *L. rhamnosus LC 705*, *L. lactis ssp. cremoris* and *Propionibacterium freudenreichii ssp. shermanii JS* fulfill the criteria for adhesive properties to the Caco-2 cell line *in vitro* (2). Bacterial attachment to intestinal surface enhances the possibility of prolonging the normal transit time and colonizing the intestinal tract.

The strains of *Lactobacilli* are known to have at least four functions in the colon:

- participation in the control of the potentially pathogenic microorganism;
- production of nutrients, mainly SCFA;
- removal of potentially toxic substances from the lumen;
- stimulation of the immune system of the intestine and the body.

Prebiotics

Prebiotics are nondigestible food ingredients that beneficially affect the host by selectively stimulating the growth and/or activity of a limited number of bacterial species already established in the colon and thus in effect improve host health. Intake of prebiotics can significantly modulate the colonic microbiota by increasing the number of specific bacteria (3).

Nondigestible oligosaccharides in general and fructooligosaccharides (FOS) in particular are prebiotics.

Immunomodulation in animal models

Lactobacilli are reported to be able to:

- Stimulate delayed hypersensitivity and antibody formation (*L. plantarum*) (4).
- Activate murine macrophage: *Lactobacilli casei* strain i.v. or i.p. was able to increase the NK cell activity of spleen cells in inbred BALB/c, male C3H/He, CBA/N and C57BL/6 mice (5, 6).
- Induce macrophage colony-forming cells (M-CFC) and serum colony-stimulating activity (CSA) in BALB/c mice. LC induced a rise in serum granulocyte-macrophage CSA similar to LPS and the proliferation of M-CFC. M-CFC-derived macrophages cultured in the presence of M-CSF expressed Mac-1 and Mac-2 but not Mac-3. These results indicate that *L. casei* stimulates the proliferation of cytotoxic macrophage progenitors in bone marrow and induces their differentiation in spleen (7).
- *Streptococcus thermophilus* and *Lactobacillus acidophilus per os* accelerate the phagocytic function of the reticuloendothelial system in Swiss mice (8, 9) and potentiate the level of activation of the immune system.
- Stimulate IFN production in mice (10, 11).
- Induce the production of IL-1 α and TNF- α by murine macrophages (12).
- Suppress total and antigen-specific IgE secretion by ovalbumin-stimulated splenocytes (13, 14).
- Protect mice from candidiasis by a variety of immunologic (thymic and extrathymic) and non-immunologic mechanisms (15).

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