

# PROPATH: PRObiotics for PATHogens

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<http://proeuhealth.vtt.fi>



PROBIOTICS are live microorganisms that, when taken up in adequate amounts as part of the food, confer a health benefit to the consumer.

Several strains of probiotic LACTIC ACID BACTERIA, in particular lactobacilli and bifidobacteria, such as *Lactobacillus casei* Shirota, *Lactobacillus johnsonii* La1, and *Bifidobacterium animalis* subsp. *lactis* DN 173-010, display health-promoting properties.

PREBIOTICS are non-digestible food ingredients that beneficially affect the consumer by stimulating the growth and/or activity of one or a limited number of bacteria in the colon.

Inulin-type fructans (derived from chicory) display prebiotic properties. In the human colon they are preferentially consumed by bifidobacteria that, on their turn, display health-promoting effects.



Bacteria from faeces of a healthy breast-fed baby that produce antimicrobial compounds.

Lactic acid bacteria produce several antimicrobial substances, such as organic acids - mainly lactic acid and acetic acid -, ethanol, hydrogen peroxide, and bacteriocins.

The antibacterial activity of bifidobacteria towards gastrointestinal pathogens, such as *Escherichia coli* and *Salmonella*, is due to the production of acetic acid and lactic acid. Prebiotics in the food might modulate this production of organic acids by bifidobacteria and lactobacilli in the gastrointestinal tract.

Lactic acid plays an important role in the antibacterial activity of certain lactobacilli against *Salmonella*.



Bacteriocin production by a probiotic *Lactobacillus* strain.

*L. johnsonii* La1 and *L. casei* Shirota, amongst certain other lactic acid bacteria, display inhibitory activity towards the gastric pathogen *Helicobacter pylori*, and the gut pathogen *Salmonella*. Both strains produce lactic acid and a bacteriocin.

Bacteriocins are antibacterial peptides that display activity towards Gram-positive bacteria closely related to the producing bacteria. They might play an important role in maintaining the equilibrium of the human gut microbiota.

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