

## The Prebiotic Potential of Different Fructooligosaccharides on Probiotic Strains and Their Possible Synergistic Effect on Human Gut Health

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The human gut microbiota is a complex ecosystem and several disorders have been associated with a compromised imbalance in the microbial community. Approaches trying to restore or prevent gut dysbiosis represent a new strategy to improve human health. Connected to this context, the aims of the present work are to evaluate the probiotic properties of specific *Lactobacillus* and *Bifidobacterium* strains; to assess the possibility to combine them with carbohydrate prebiotics in order to support their growth and efficacy; to setup a pre-/pro- biotic combination in order to obtain a symbiotic; then to evaluate the beneficial effects of the synbiotic on human health and on the human gut microbiota. *Lactobacillus plantarum* LP, *Lactobacillus rhamnosus* LRh and *Bifidobacterium animalis* subsp. *lactis* BL showed good probiotic features. They were able to antagonize the growth of various pathogens. In particular, LP could secrete metabolites such as bacteriocin-like compounds. The strains were also able to modulate the release of diverse inflammatory cytokines and to increase the antioxidant potential in HT-29 cell line. *In vitro* fermentations revealed that mixtures of fructooligosaccharides of short degree of polymerization were highly fermented by these strains, while limited growth was observed on inulin with a degree of polymerization up to 60. Therefore, it was possible to design a pre-/pro-biotic formulation, with the most powerful probiotics and the suitable fiber. At the moment the administration of the designed symbiotic to an elderly population for 28 days is over and we are analyzing the results that can support a real therapeutic effect of our pre-/pro-biotic formulation. Furthermore, the analysis of the gut microbiota before, during and after the administration of the symbiotic are ongoing, in order to assess if our formulation has shaped the microbiota towards to a general well-being.

