

Prebiotic effect of Maitake extract on a probiotic consortium and its action after microbial fermentation on colorectal cell lines

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Abstract: *Grifola frondosa*, known also as Maitake, is a medicinal mushroom famous for its peculiar biological activities due to the presence of functional components, including dietary fibers and glucans, that can improve human health. Its action as a prebiotic and the possible modulation of the human gut microbiota are still little investigated.

In this work, a Maitake ethanol/water extract was prepared from the sporophora of wild mushrooms from China and characterized through enzymatic and chemical assays for the presence of different sugars, proteins, and polyphenols.

After the assessment of the presence of fermentable molecules, the prebiotic potential of the Maitake extract was assayed monitoring the growth of some probiotic strains, belonging to *Bifidobacterium* and *Lactobacillus* genera. Also, the growth of the selected probiotic consortium, composed of eight probiotics, was considered. The results revealed the prebiotic properties due to the high stimulation of the growth of the probiotic strains and the consortium.

Furthermore, short-chain (SCFAs) and branched-chain (BCFAs) fatty acids were extracted and characterized through GC-MSD analysis. Lactic, succinic, and valeric acid were detected after probiotic consortium fermentation of the Maitake extract.

Then, possible beneficial effects of the produced secondary metabolites were assessed evaluating the vitality of three different healthy and tumoral colorectal cell lines (CCD841, CACO-2, and HT-29), exposed to different concentrations of SCFAs. Moreover, the viability rescue after co-exposure to different stressor agents (H₂O₂ and SDS) and the probiotic consortium secondary metabolites was tested. The results showed that the metabolites exerted positive effects on colorectal cell lines, protecting them from reactive oxygen species.

In the future, the effect of a synbiotic formulation (composed of probiotics and the Maitake extract) will be tested on a defined synthetic *in vitro* gut microbiota, to investigate the prebiotic effect, the modulation of the bacterial community after the intervention, and the production of secondary metabolites. Furthermore, the possible beneficial effects for the host will be evaluated through different *in vitro* models.