

## **Peculiar properties of propionibacteria lead to unexpected probiotic properties**

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Cheeses and other fermented dairy products constitute a tremendous source of live and active bacteria in our diet. Depending on the product, on the strain and on the health status of individuals, this major bacterial intake can have beneficial effects, or not! Recognized molecular, cellular and animal models have been developed to detect and study probiotic bacterial strains. These tools may also reveal unexpected probiotic potential in bacterial strains within the tremendous biodiversity present in traditional fermented products. In our team, we focused on dairy propionibacteria, taking advantage of a unique biological resource center. Propionibacterium freudenreichii is a beneficial bacterium used in the food industry as a vitamin producer, as a bio-preservative and as a cheese ripening starter. We hypothesized that strains considered for techno-functional reasons (aroma, texture), may also play a beneficial role as probiotics.

Food-grade dairy propionibacteria are nutraceutical producers. They release short chain fatty acids (SCFAs), folic acid and cobalamin, which play a role in intestinal physiology. SCFAs induce apoptosis via the mitochondrial death pathway. We investigate the potential of dairy propionibacteria-fermented products to synergize with drugs used in gastric and colorectal cancer.

Some strains are known to adhere to intestinal epithelial cells and mucus and to modulate important functions of the gut mucosa, including cell proliferation and immune response. Selected strains show promising immunomodulatory properties with an anti-inflammatory protective evidenced effect in vitro and in vivo. We thus developed experimental monoxenic fermented dairy products, exclusively fermented by an anti-inflammatory selected strain of P. freudenreichii. Key surface proteins, involved in its immunomodulatory effects, are expressed within these products. Their consumption exerted an anti-inflammatory effect in vivo.

These results open new perspectives in the field of prevention and/or treatment of intestinal cancer (CRC) and inflammatory diseases (IBD). The synergy with pro-apoptotic chemotherapy molecules suggests that such a fermented product, or the Propionibacterium alone, may be proposed as a food supplement to enhance the effects of anticancer treatments. The preventive effect in the context of induced colitis suggests that it could potentialize IBD treatment.

This work reveals an unexpected probiotic potential in industrial dairy propionibacteria starters. It opens exciting perspectives in a context of growing occurrence of IBD, multifactor diseases related to diet, and provides a new functional fermented product for preclinical and clinical studies aimed at prevention or treatment of IBD.