

The cheese matrix modulates the immunomodulatory properties of *P. freudenreichii* CIRM-BIA 129 in healthy piglets

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Introduction

Propionibacterium freudenreichii (**PF**) is a beneficial bacterium, used as Swiss-type cheeses starter. PF exerts several beneficial effects, including anti-inflammatory modulation. This feature relies on several metabolites and on surface proteins. PF emerges as a suitable candidate to develop fermented functional foods. As it is established, the probiotic properties are strain-dependent, however the delivery vehicle effect is barely explored.

Aim

In this study, our purpose is to explore how the cheese matrix impact its immunomodulatory properties on model of healthy piglets.

Methods

Three groups of weaned piglets were fed during 2 weeks with **PF** in form of a culture or of a fermented cheese and compared to a control group fed with sterile cheese. **PF**'s metabolic activity was assessed by short chain fatty acids dosage and microbiota modulation. Immune cells from small intestinal mesenteric nodes (MLNC) and blood (PBMC) were extracted. The basal cytokines secretion and T lymphocytes phenotypes were evaluated. Then, the immune cells were *ex vivo* stimulated by pro-inflammatory and anti-inflammatory stimuli and the cytokine response was determined.

Results

PF was metabolically active in piglets' colon and enhanced bifidobacteria population and SCFAs production, without significant difference between the two delivery vehicles. **PF** decreased the secretion of TNF α and IL-10 secretion only by PBMC. In MLNC, **PF** cheese enhanced Treg and Th2 populations and sustained Th17 population. **PF** culture enhanced Th1 population and decreased Th17 population in MLNC. In PBMC, **PF** ingestion enhanced Treg and Th2 populations, without difference between the two delivery vehicles. *Ex vivo* stimulation of PBMC and MLNC show the anti-inflammatory effect of **PF** and its surface proteins only when it provided only within a cheese.

Conclusion

These results provide new insights into the cheese matrix effect on *P. freudenreichii* probiotic functionalities. Such data showed the relevance to take in account the delivery vehicle to develop functional foods.