Probiotics and intolerance: going behind the wall

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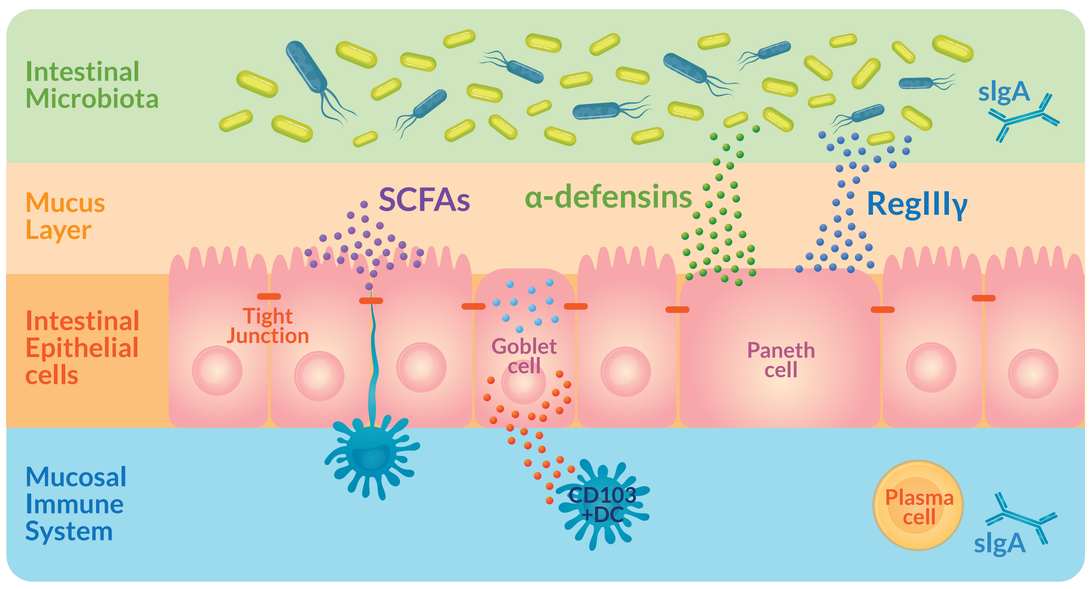
INTRODUCTION

- The exact prevalence of **food intolerance** and **food allergy** is not known, but almost **20% of the population** refers several symptoms that can be related to these condition. Several pathogenic mechanism has been reported, including theories related to the role of the **gut wall** and the role of **microbiota.**
- Here we will discuss about the pathogenic mechanism of these conditions and the possible therapeutic role of **probiotics,** focusing on the interaction between Enterogermina and the instestinal barrier (Tight junction, mucine expression) as well as other mechanism which go "behind the wall" such as modulation of the immune system and beta galactosidase production.

GUT MUCOSAL BARRIER, FOOD TOLERANCE AND FOOD ALLERGIES

- The ephitelial barrier plays a major role in the immune homeostasis of intestinal tract by separation of antigens, pathogens or commensals form the ephitelial layer to prevent interaction of intact antigens or bacteria with the ephitelial layer. Intestinal permeability may undergo variations that play a fundamental role in food tolerance and food allergies.[1]
- Resident microbial communities vastly outnumber human cells and genes, motivating interest in their dysregulation (ie, dysbiosis) may influence host immonologic development and risk for allergic disorders.[2]

Figure 1: Structure of the intestinal barrier. The multiple layers of the intestinal epithelial barrier are responsible for spatian segregation of antigens and pathogens from intestinal epithelial cells and immune induction sites. On the luminal side, commensal bacteria, antimicrobial products such as α-defensins and secretory immunoglobulin A antibodies as well as the mucus layer limit interaction of pathogens with epithelial cells. Under healthy conditions, intestinal epithelial cells form a tight monolayer, allowing only selective permeability. Below the epithelial layer, the mucosal immune system contributes to the epithelial barrier function.



THE ROLE OF PROBIOTICS

Probiotics administration has been proposed to be effective for treatment and prevention of food allergy.[3] The beneficial effect of probiotics is mediated by multiple mechanism:

- Cytoprotection, cell proliferation, cell migration, resistance to apoptosis, synthesis of proteins and gene expression.
- Strengthen the epilethial tight junctions and preservation of mucosal barrier function.

Probiotics not only enhance barrier function by inducing synthesis and assembly of tight junction proteins, but also preventing disruption of tight junctions by injurious factors. Bioactive factors released by probiotics trigger activation of various cell signaling pathways that lead to strenghtening of tight junctions and the barrier functions.[4]

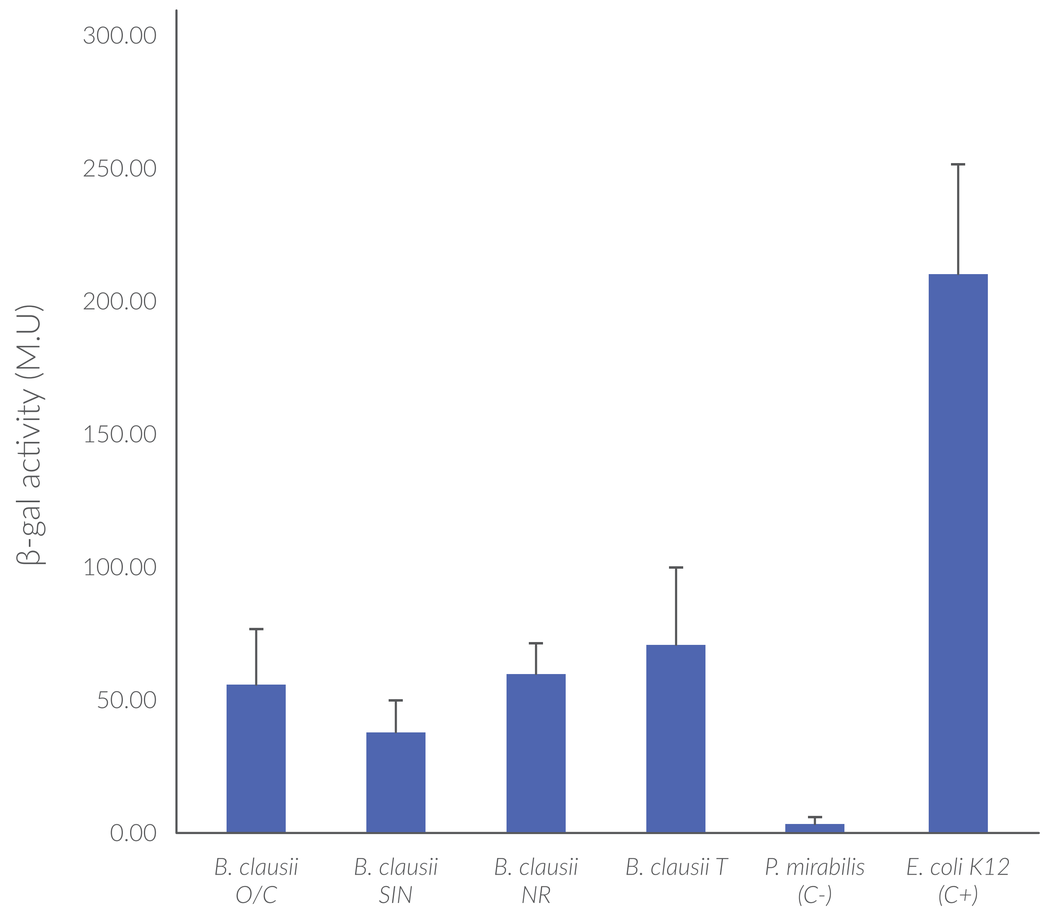
BACILLUS CLAUSII

Bacillus clausii probiotics strains and ther metabolites have a protective action on the intestinal barrier. This may interact with tight junction regulation and prevent from "leaky gut". New data are available in order to better understand the mechanism behind.

- HBD-2 and LL-37 are antimicrobial peptides of innate immunity, responsible for effective defense mechanisms against several pathogens in the GI tract: *B. clausii* elicited an increase of HBD-2 and LL-37 synthesis by human enterocytes.[5]
- Increase MUC5AC expression levels and TJ proteins expression levels (occludins and ZO-1).[5]

ENZYMES PRODUCTION

Enzymes production activity of *B. clausii* probiotics strains may have a crucial role in food sensitivity. From preliminary data, the activity of *B. clausii* in production of *b-galactosidase* is known.[6]



Production of b-galactosidase by *B. clausii* may be useful for lactose intolerance people.

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