In vitro assessment of immunomodulatory properties of Bacillus-based probiotics

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Introduction
Efficacy of antibiotic growth promoters (AGPs) has long been only thought to be due to their antibiotic activity. However, more and more evidence shows that AGPs have also a strong role in inhibiting intestinal inflammation (Niewold, 2007). Thus, non-antibiotic compounds showing immunomodulating properties, such as probiotics, could be good candidates to replace AGPs. The immunomodulatory properties of probiotics are well recognized, but they are strain specific. The objective of this study was to investigate the immunomodulating properties of the new Bacillus subtilis probiotic strain 29784 in comparison with two other commercially available Bacillus subtilis strains (Bs A and Bs B).

Materials and Methods
- Human intestinal epithelial cells (Caco-2 cells) were used to evaluate the ability of B. subtilis strains to prevent inflammation in stimulated and non-stimulated conditions.
- Vegetative cells of each B. subtilis strains, or a positive control, epigallocatechin gallate (EGCG) known for its anti-inflammatory properties (Kim et al., 2006), were applied overnight to a 14-day differentiated Caco-2 cell monolayer established in a transwell system.
- Caco-2 cells were then exposed, or not, to the inflammatory mediator IL-1β during 6 hours.
- Transepithelial Resistance (TER) and IL-8 production were then monitored as indicators of intestinal permeability and inflammation, respectively (Maresca et al., 2008).

Results
- TER, as indicator of tight junction cohesiveness, was improved by the positive control EGCG in both standard and IL-1β stimulation conditions.
- Interestingly, the 3 B. subtilis strains had different impacts on TER. Whereas Bs A decreased TER, Bs B had no effect and B. subtilis 29784 increased it as did the positive control EGCG.

Conclusions
Our results clearly show that different B. subtilis strains can have different levels of efficacy to modulate inflammatory response and intestinal permeability. B. subtilis 29784 thus appears an efficient probiotic solution as it both enhances intestinal barrier cohesiveness and reduces intestinal inflammatory status.

References: