Effect of vitamin C, B2 and D on probiotic *L. rhamnosus GG* (DSM 32550) and *B. lactis* (DSM 32269) using the SHIME® technology

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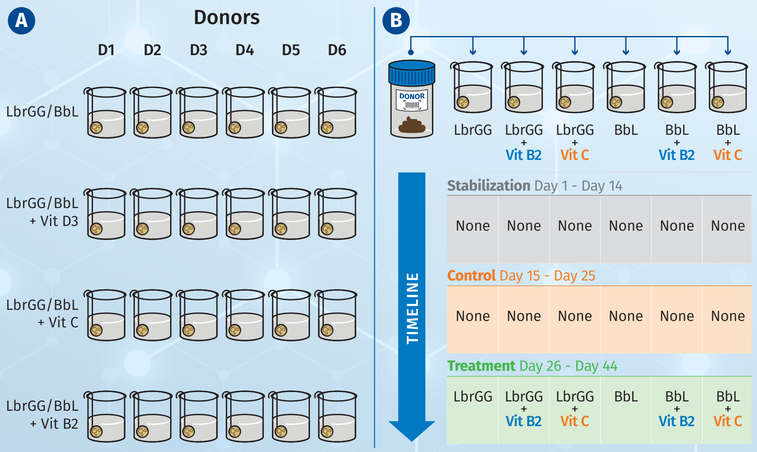
Background and objective

We recently reported that colon-targeted vitamins modulate composition and metabolic activity of the gut microbiome in humans[1]. Whether they affect colonization of probiotics remains, however, unknown.

Methods

We used the SHIME *in vitro* fermentation model to investigate the effect of vitamin-C, -B2 and -D on colonization efficacy of *L. rhamnosus GG* (DSM 32550; LbrGG) and *B. lactis* (DSM 32269; BbL) in six parallel, short-term, colonic incubations using fecal inoculum from different donors (A). In a follow-up long-term fermentation experiment, the effect of 3-weeks repeated supplementation of LBrGG and BbL +/- vitamin-C or -B2 was investigated using fecal inoculum from one donor.

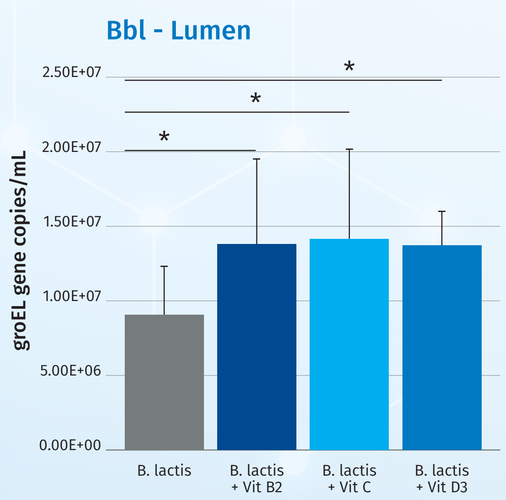


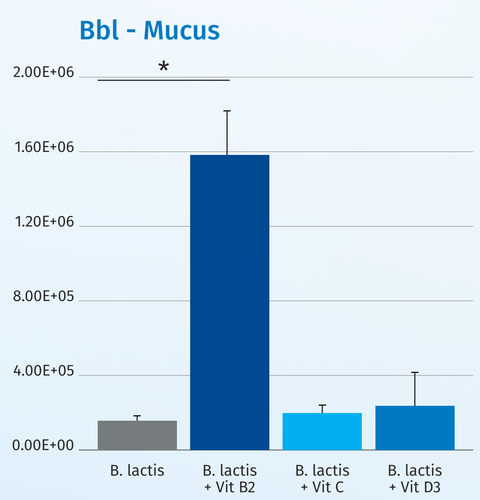
Conclusion

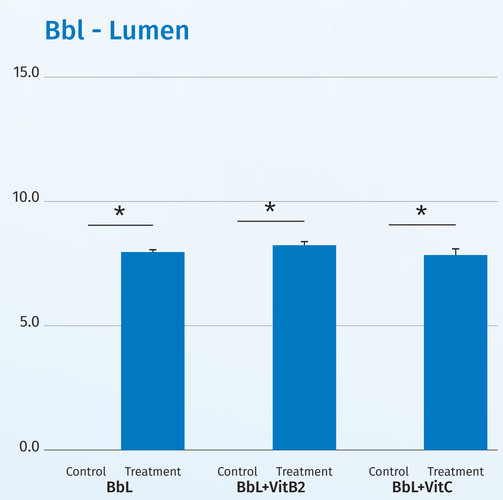
Our study shows that co-supplementation of particularly vitamin-B2 may enhance the colonization of commercial probiotics, however, more research is warranted to proof that this is the case also in humans.

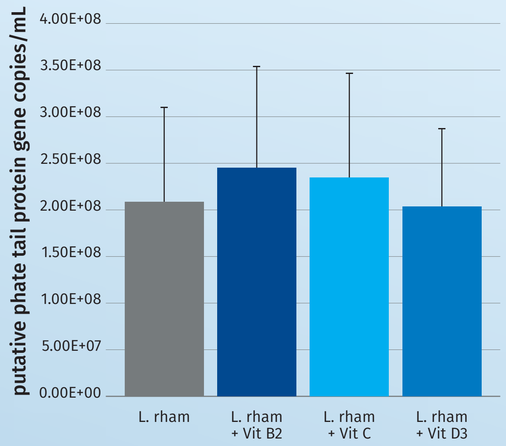
Results

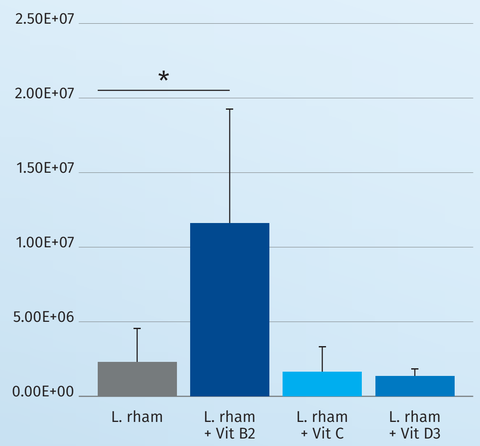
Short-term, qPCR analysis showed that vitamin-C, B2 and D significantly increased BbL, but not LbrGG levels in luminal environments when compared to control. In contrast, only vitamin-B2 significantly enhanced LbrGG and BbL levels in mucosal environments. There was also a slight, but significant, increase in total SCFA with BbL plus vitamin-C vs. BbL alone and significantly increased butyrate with either BbL or LbrGG plus vitamin-C vs. probiotic alone (not shown). Long-term, 16S rRNA gene sequencing analysis coupled with flow cytometry showed an increase in absolute abundance of BbL in mucosal environments when co-supplemented with vitamin-B2. However, the effects of vitamins to enhance levels of both probiotics could not be confirmed using qPCR analysis.

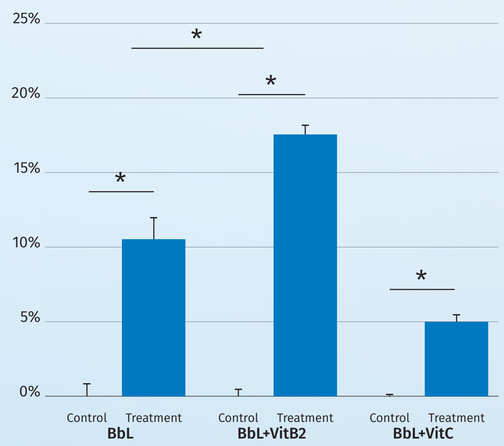












1, Pham VT & Steinert RE et al. Gut Microbes. 2021 Jan-Dec;13(1):1-20.