The mucus-targeted strategy of *Lactococcus lactis*: an array of opportunities of transient food-borne bacteria for a healthy gut?

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Emerging evidence suggests that transient food-borne bacteria, especially *L. lactis*[1], play a significant role in host health through adhesion to the intestinal wall and/or growth *in vivo*. We previously reported, in *L. lactis* TIL448 strain, the dual impact of plasmid-encoded pili and mucus-binding protein in adhesion to pig gastric mucin, as probed with Atomic Force Microscopy and shear stress flow chamber[2]. In the present study, we confirmed the high adhesion of TIL448 to mucus secreted by HT29-MTX intestinal cells, as well as to human intestinal mucins, in comparison with TIL1230 strain, a derivative of TIL448 obtained by plasmid curing and then devoid of pili and mucus-binding protein. The highest adhesion level was found for ileal mucin. Besides adhesion, intestinal growth of *L. lactis* may be a key parameter for its transient gut persistence. It requires carbon sources such as mucin-derived carbohydrates, which are used by metabolically active *L. lactis* in the gut[3]. We thus evaluated capabilities of TIL448 to grow and degrade fucose, galactose, N-acetylglucosamine (GlcNAc), N-acetylgalactosamine (GalNAc) and mannose (*vs.* glucose). No growth occurred on fucose and GalNAc whereas, similarly to glucose, TIL448 was able to metabolize mannose and GlcNAc, as well as galactose, albeit to a lesser extent. Interestingly, changes in mucin O-glycosylation were observed in the ileum and colon of TIL448-treated mice. *L. lactis* TIL448 thus exhibits mucus affinity (*i.e.* muco-adhesion, muco-degradation and muco-modulation), which may confer to this strain increased fitness in the gut for sustainable beneficial effects.

1. Zhang C. *et al.* ISME J. 2016; 2. Le D.T.L. *et al.* PLoS One 2013; 3. Roy K. *et al.* Proteomics 2008.