Muriel Thomas et al., J Prob Health 2017, 5:3(Suppl)
DOI: 10.4172/2329-8901-C1-024

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

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Statement of the Problem: Emerging evidence suggests that transient food-borne bacteria, especially *L. lactis* 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.

Methodology & Results: 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 mucin 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. 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.

Conclusion & Significance: *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.

Biography

Muriel Thomas is a Senior Scientist at INRA (DR2), and her projects focus on the health benefits sustained by diet and microbes. She leads the group microbiota and epithelia which has contributed to a better understanding of the dynamic dialogue installed between the intestinal epithelium and microbiota. Her expertise is based on the use of germ-free and gnotobiotic rodents combined with cellular tools and the isolation of new beneficial microbes. Recently, she has developed a new area of expertise around the microbes found in lungs and regulating the susceptibility to respiratory diseases like asthma. The group combines approaches at the frontier between physiology, microbiology and nutrition. In addition, her engagement in public health agency (ANSES) and nutrition-specialized societies (SFNEP) is an asset to adapt her projects with the public health priorities, regulatory framework and food safety policy.

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