

JOINT EVENT

10th International Virology Summit
&
4th International Conference on Influenza & Zoonotic Diseases
July 02-04, 2018 | Vienna, Austria

***Lactobacillus* stimulates intestinal epithelial proliferation to repair mucosal barrier through activation of Wnt/ β -catenin pathway**

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The detailed protective mechanisms of *Lactobacillus* on intestinal mucosa, especially from proliferation of intestinal stem cells, are still incompletely understood. In this study, intestinal organoids and mice were used to explore protective effect of *Lactobacillus* on intestinal mucosal barrier. We found that *L. acidophilus* increased survival ratio of mice infected with *S. typhimurium*, as well as reduced IL-1 β and TNF- α secretion and *S. typhimurium* colonization in feces. *S. typhimurium* infection caused crypt hyperplasia with enhancement of PCNA+ cells and crypt length remarkably with over-expression of β -catenin, which was also remitted by *L. acidophilus* administration. Similar protective effects of *L. acidophilus* on inhibiting intestinal inflammation and crypt hyperplasia induced by *S. typhimurium* infection was also observed in intestinal organoids by alleviating TNF- α secretion and β -catenin over-expression. *S. typhimurium* infection caused UEA-1+ goblet cells and Lysozyme+ Paneth cells hyperplasia both in mice and organoids to defend against *S. typhimurium* invasion through exploiting TLR2 and TLR4. However, *L. acidophilus* ATCC 4356 ameliorated over-activation of TLRs and Wnt/ β -catenin pathway to impair excessive expansion of goblet cells and Paneth cells induced by *S. typhimurium*. Our study implied that *S. typhimurium* protected intestinal mucosa against *S. typhimurium* infection by modulating Wnt/ β -catenin pathways to affect intestinal epithelial proliferation..

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