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Short Communication

Pathogen and Host-Microbe Interaction in *Lactobacillus Plantarum*

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DESCRIPTION

Surface adhesins of pathogens and probiotics strains are implicated in arbitrating the binding of microbes to host. Mucus-Binding protein (Mub) is unique to gut inhabiting lactic acid bacteria; however, the detailed role of Mub proteins or its structural domains in host-microbial interaction is not well understood. Last two domains (Mubs5s6) of the six mucus-binding domains decided in tandem at the C-terminus of the Lp_1643 protein of *Lactobacillus plantarum* was expressed in *E. coli*. Mubs5s6 presented binding with the rat intestinal mucus, pig gastric mucins and human intestinal tissues [1]. Preincubation of Mubs5s6 with the Caco-2 and HT-29 cell lines reserved the binding of pathogenic enterotoxigenic *E. coli* cells to the enterocytes by 68% and also 81%, respectively. Mubs5s6 binding to the host mucosa components like cytokeratins, Hsp90 and Laminin. Mubs5s6 was predicted to possess calcium and glucose binding sites. This binding of Mubs5s6 with these ligands is known to be related with pathogenesis signifying Mub might negotiate pathogens in multiple ways [2]. To study the feasibility of Mubs5s6 delivery in the gut, it was abridged in chitosan-sodium tripolyphosphate microspheres with an efficiency of 65% and announcement up to 85% in near neutral pH zone over a period of 20 hours. Mub plays important role in the host-microbial cross-talk and possesses the potential for pathogen exclusion to a greater extent than arbitrated by *L. plantarum* cells. The functional and technological physiognomies of Mubs5s6 make it suitable for contravention the host-pathogen interaction [3].

Mucus layer of mammalian gut protects against pathogens by shedding off the bound bacteria by peristalsis from the gut. Lactic Acid Bacteria (LAB) are normal inhabitants of mammalian gut and certain have been recognized as probiotics. Probiotics are live microorganisms which when administered in adequate quantities confer a health benefit to the host. Probiotics have been connected with gut health *via* modulating the host immune system and the inhibition of pathogens by secreting antimicrobial factors in the gut [4]. Enterotoxigenic *Escherichia coli* (ETEC) is an important gastrointestinal pathogen responsible for bacterial diarrhea throughout the world. ETEC treatment includes broad range antibiotics as the mainline treatment. ETEC and many additional gut pathogens employ strategies involving surface adhesins and secretion of toxins to overwhelm host immune system. Antimicrobial resistance in bacteria counting gastrointestinal pathogens is ever-increasing and availability of fewer novel antibiotics has worsened the situation. Antimicrobial resistance has prompted intense research to find non-antibiotic based strategies to counter the pathogens. In this context, other treatment like Microbial Interference Therapy (MIT) based on adhesion property of probiotics has shown good promise. Bacterial adhesion holds center-stage in host-microbe interactions and has been proposed to be mediated by surface adhesion proteins like the Mucus-binding protein (Mub), fibronectin binding protein, S-layer protein, collagen binding protein and others [5]. Mucus is a complex viscous mixture of carbohydrates and proteins that deliver protection against pathogens by preventing their settlement in the host gut Almost 70% of total proteins in mucus are signified by various classes of mucins, which help as decoy receptors for microbes. Bacterial adhesins interact with numerous surface receptors or cytoskeleton proteins of epithelial cell in the Gastrointestinal Tract (GIT) of the host to mediate bacterial binding. Probiotics and pathogens competition for the mutual cell receptors for binding with the gut lining in the host's GIT.

CONCLUSION

Consequently, understanding of the mechanism of host-microbial interaction would cover a way to disrupt the host-pathogen interaction and designing of novel molecules for the pathogen exclusion from the host. Mub proteins though represented in diverse species are a peculiar surface adhesion protein restricted to only gut inhabiting species. These proteins cover repetitive Mub domains which are presumed to bind the mucin proteins current in the host mucosa. Mub protein (Lp_1643) from *L. plantarum* has interesting architecture in consuming six tandem Mub domains interspersed by spacer regions.

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