

Prevention of respiratory syncytial virus infection with probiotic lactic acid bacterium *Lactobacillus gasseri* SBT2055.

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Introduction

Lactobacillus gasseri SBT2055 (LG2055) is a probiotic lactic acid bacterium with multifunctional effects, including reduction of adipocyte size in mice, increased lifespan in *Caenorhabditis elegans*, and the prevention of influenza A virus infection in mice. On the other hand, respiratory syncytial virus (RSV) is a global pathogen. There is no vaccine that has been put to practical use, and specific therapeutic agents against RSV infection are limited to the bench, but not yet the bedside.

Aim

We investigated whether LG2055 exhibits antiviral activity against RSV in vitro and in vivo.

Methods

We performed an infection assay for RSV strain A2 in HEp-2 human laryngeal epithelial cells and MLE12 mouse lung epithelial cells. To investigate whether the antiviral activity and prophylactic effects of LG2055 against RSV infection occurred *in vivo*, LG2055 was orally administered to mice daily for 21 days and the mice were then infected with RSV, then the symptoms and antiviral host responses were analyzed. To elucidate the molecular mechanism by which LG2055 mediates the alteration of protein expression and exerts antiviral activity against RSV, we performed fast proteomic screening using LC-ESI-MS/MS.

Results

LG2055 inhibited RSV specific gene expression in HEp-2 cells and MLE12 cells. Following oral administration of LG2055 in mice, the RSV titre in the lung was significantly decreased, while body weight was not decreased after virus infection. Additionally, the elevated expression of pro-inflammatory cytokines in the lung upon RSV infection decreased in LG2055 administrated mice. Comparative cellular proteomic analysis revealed that SWI2/SNF2-related CREB-binding protein activator protein (SRCAP) was critical for the antiviral activity of LG2055 against RSV infection.

Conclusion

Our study demonstrated that LG2055 has prophylactic potential against RSV infection.