A metagenomic study of the preventive effect of *Lactobacillus rhamnosus* GG on intestinal polyp formation in ApcMin/+ mice.


Abstract

**Aims**

To investigate the *in vivo* effects of *Lactobacillus rhamnosus* GG (LGG) on intestinal polyp development and the interaction between this single-organism probiotic and the gut microbiota therein.

**Methods and Results**

The ApcMin/+ mouse model was used to study the potential preventive effect of LGG on intestinal polyposis, while shotgun metagenomic sequencing was employed to characterize both taxonomic and functional changes within the gut microbial community. We found that the progression of intestinal polyps in the control group altered the community functional profile remarkably despite small variation in the taxonomic diversity. In comparison, the consumption of LGG helped maintain the overall functional potential and taxonomic profile in the resident microbes, thereby leading to a 25% decrease of total polyp counts. Furthermore, we found that LGG enriched those microbes or microbial activities related to short-chain fatty acid production (e.g. *Roseburia* and *Coprococcus*), as well as suppressed the ones that can lead to inflammation (e.g. *Bilophila wadsworthia*).

**Conclusions**

Our study using shotgun metagenomics highlights how single probiotic LGG may exert its beneficial effects and decrease polyp formation in mice by maintaining gut microbial functionality.

**Significance and Impact of the Study**

This probiotic intervention targeting microbiota may be used in conjugation with other dietary supplements or drugs as part of prevention strategies for early-stage colon cancer, after further clinical validations in human.
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