Bovine milk-derived exosome attenuate dextran sulfate sodium-induced colitis by modulating gut microbiota

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Introduction

A recent study provided evidence that the bovine milk-derived exosome (bME) can transfer immune-related miRNAs and modulate immune responses such as cytokine production and macrophage proliferation.

Aim

In this study, we used a mouse colitis model to investigate on the protective role of bME by modulating gut microbiota.

Methods

Colitis was induced in C57BL/6 mice using 5% dextran sulfate sodium (DSS) water. bME were isolated from bovine colostrum using a method developed in our lab to maximize yield of exosomal RNA. Severity of disease was evaluated by the biological markers. Diversity of gut microbiota in fecal samples were analyzed by illumina sequencing. In addition, the transcriptional levels of mucin genes (MUC1, MUC2 and, MUC3) were determined on intestinal tracts by qRT-PCR.

Results

Indicators of colitis including weight loss and colon length were also significantly lower in mice treated with DSS and bME compared to mice treated with DSS only. Desirable changes in expression of mucin genes including MUC1, MUC2, and MUC3 are relevant in the progression of ulcerative colitis were also observed. Gut microbiota analysis showed that significant increase of the Verrucomicrobia in bME groups and decrease of the Tenericutes at the level of phylum. Notably, DSS treatment changed microbial compositions and when given together with bME increased the abundance of *Akkermansia muciniphila* a documented biomarker for healthy intestine as novel probiotics candidate.

Conclusion

Our results suggest a potential application of bME in protection against DSS induced colitis in mice. Also, enhanced mucin synthesis and stimulation of beneficial microbiota may play a prominent role in protection against DSS-induced colitis.