

Cytokine based Inflammatory Bowel Disease - Ulcerative Colitis clearance using probiotics

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Introduction: Ulcerative colitis (UC) is multifactor prototypical complex, chronic and relapsing inflammatory bowel disease affecting the colon with heterogeneous manifestations which pose challenges about understanding their pathogenesis and cure. Gut-microbiota axis proved to be vital. Microbial quorum sensing (QS) plays an important role, helps bacteria for regulation of population, gene expression, virulence, metabolism, etc. Autoinducer-2 (AI2) acts as common lexicon for interspecies and genus communication, the precursor 4,5-dihydroxyl-2,3-pentanedione (DPD) is skeleton for all AI2's, hence DPD is used for metabolic synchronization. Inflammatory cytokine plays a key role in IBD hence they are assessed in this study for the potential of probiotics against clearance of UC.

Materials and Methods: UC is induced in 8 weeks old C57BL/6 mice (8 gp, n=10) with DSS for 8 days and 12 bacterial strains are supplemented (OD600 = 1, 0.8-1.2 × 10⁹ - 12 CFU/ml) along with FOS, QSSM (10 nM) for 10 days. Akkermansia muciniphila, Lactobacillus plantarum, Bifidobacterium bifidum, Bifidobacterium breve, Bifidobacterium longum, Lactobacillus acidophilus, Lactobacillus casei, Lactobacillus paracasei, Lactobacillus plantarum, Lactobacillus reuteri, Pediococcus acidilacti and Streptococcus salivarius were used in this study. DSS induction will be assessed by DAI score and on 10th day samples are collected and immediately snap frozen in LN2 and stored at - 80 °C until analysis. Using Millipore's MILLIPLEX MAP Mouse Cytokine Coupled with the Luminex xMAP® platform in a fluorescent-coded MagPlex TM-C magnetic bead format ELISA for assessing IFN γ , IL-6, TNF- α , IL-1 β , IL-22.

Results: Probiotics supplemented group's DAI scores are similar as control group from 8th day. Whereas non-probiotic groups including anti-inflammatory supplement groups showed similar DAI scoring index of DSS. In our study both IFN- γ and TNF- α has observed to be reduced when probiotics are supplemented. IL-22 is anti-inflammatory cytokine which is expressed to stabilize the pro-inflammatory conditions. The study shows the probiotics supplemented groups and anti-inflammatory supplemented groups showed the least expression of IL-22 which means the inflammatory conditions are under control which is remarkably similar to the control group. IL-1 β also showing a similar patten where the probiotic supplements have reduced inflammation in the circulatory system.

Conclusion: Probiotic treated animals showed similar cytokine profile as control group and in contrast with DSS treatment groups which shows the retrieval from the IBD-UC condition. The probiotics shows good alternative novel therapeutic approach for clearance of colitis conditions.

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