

MUCOLYTIC ACTIVITY OF AKKERMANSIA MUCINIPHILA ENABLES HUMAN MILK OLIGOSACCHARIDES UTILIZATION

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Introduction and objectives: *Akkermansia muciniphila* is a member of the intestinal microbiota specializes in mucus degradation. It is found to be abundant in healthy mucosa while it is inversely correlated to intestinal disorders such as IBD, Crohn's disease, ulcerative colitis and appendicitis, rendering *A. muciniphila* a potential biomarker for a healthy intestine. The enzymes that *A. muciniphila* harbours to degrade mucin can target similar structures in Human Milk Oligosaccharides (HMOs). This could explain the presence of this organism in the early life intestine. The aim of this study is to evaluate the ability of *A. muciniphila* to degrade HMOs.

Materials and Methods: *A. muciniphila* was grown on basal medium supplemented with human milk or HMOs as sole carbon and nitrogen source. Microbial growth was determined by plating (CFU/ml) and optical density (600 nm) while the fermentation products were analysed by HPLC. Moreover, selected samples were processed for transcriptomic analysis by RNA-Seq.

Results and Discussion: After 8 hours of incubation with human milk, growth of *A. muciniphila* increase of 5-fold in CFU counts. HPLC analysis revealed that propionate and acetate were produced. On top of this, monomeric sugars were released, transcriptome analysis by RNA-Seq showed upregulation of genes involved in lactose degradation, carbohydrate transport and translational activity in *A. muciniphila* grown on human milk in comparison to mucin. However, the expression of genes involved in mucin degradation was not affected by the experimental conditions, suggesting that *A. muciniphila* is capable of using these genes also for utilization of human milk glycans. The capacity to survive in the early life environment by degrading and consuming human milk components might be beneficial for *A. muciniphila* during initial colonization before reaching the mucosal layer in the intestine.