Altered microbiota in microscopic colitis

Recently, Shin et al reported that Akkermansia spp had a beneficial effect on glucose homeostasis in obese mice. Mucin degrading Akkermansia—promoting mucin degradation and turnover—is associated with a healthy mucosa. In IBD, a deranged microbiota is reported while findings in microscopic colitis (MC) are lacking. MC is a disorder characterised by chronic non-bloody diarrhoea, predominantly affecting elderly smoking women. Despite frequent diarrhoea, laboratory anomalies are seldom seen.

Since an altered microbiota is reported in several immune mediated diseases and since MC affects the gut, our hypothesis was that the microbiota would be altered in patients with MC.

A group of 10 female patients (mean age 48 years, range 43–68 years) with onset of MC collected as previously described1 donated faecal samples that were compared with samples from seven healthy control women (mean age 50 years, range 45–65 years) with respect to their faecal microbiota.

The bacterial microbiome was analysed by DNA sequencing (Illumina Hiseq 2000) and sequences were aligned to a catalogue of sequenced genomes from the National Center for Biotechnology Information and hmpdacc.org to determine the composition of the microbiota. Sequences were aligned with Bowtie to the sequenced species catalogue of 2382 genomes. Alignments with the fewest number of mismatches were counted. Relative abundance was calculated by calculating the ratio of aligned reads of each genome to the total number of aligned reads. Details about the bioinformatics methods, MEDUSA pipeline, have been described previously.3 Patients with MC had a marked reduction of Veruccomicrobia (Akkermansia spp) compared with healthy individuals (figure 1), with a difference approaching 2–3 log (p=0.02; Wilcoxon rank-sum test). In other species (Bacteroides and Prevotella), some differences could be noticed although not reaching statistical significance.

The notion that patients with MC had a significantly lower amount of Akkermansia was further strengthened with specific Akkermansia spp. PCR performed on the 10 patients and 7 controls and on an additional 5 female patients with MC (total mean age 50 years, range 43–65 years) and 7 female controls (total mean age 51 years, range 45–73 years) (figure 2). Although the number of patients with MC was low, it should be noted that the smokers had extremely low levels of Akkermansia.

Akkermansia is one of the most prevalent bacterial strains in the large intestine. It has been shown in mice that Akkermansia thickens the mucin layer, and thus may protect...
the epithelium against potentially toxic faecal material. The patients with MC were diagnosed because of onset of diarrhoea why chronic disease or continuous medication did not contribute to the alteration. Smoking seems to contribute to the low levels found in MC. The association with smoking is in line with the situation in several types of immune mediated diseases where smoking is detrimental for the disease course, such as Crohn’s disease or rheumatoid arthritis. Since smoking has been shown to be a risk factor for MC and since smoking and changed smoking habits have been reported to induce profound changes in the microbiota at least in healthy individuals, it could be speculated that an increased risk for MC could be mediated by changes in the microbiota.

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Acknowledgements We thank Skane county council’s research and development Foundation, Anna and Edwin Berger’s Foundation, the Bengt Ihre Foundation, Tore Nilsson’s Foundation ‘Nio meter liv’ Knut and Alice Wallenberg Foundation, Torsten Söderbergs Foundation and Anna Lisa and Sven-Eric Lundgren’s foundation for their financial support. The computations were performed on resources at Chalmers Centre for Computational Science and Engineering (C3SE) provided by the Swedish National Infrastructure for Computing (SNIC).

Contributors Conception and design: HF, EH, CB, ET, MO and KS. Development of methodology: HF and FK. Acquisition of data: HF, EH, CB, ET, MO, ML and KS. Analysis and interpretation of data: HF, EH, FK, ML and KS. Administrative, technical or material support: EH, MO and KS. Study supervision: EH and KS. All have contributed with writing, review and revision of the manuscript and have approved the final version of the paper.

Competing interests None.

Ethics approval Lund University.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement Data have been uploaded to the European Nucleotide Archive. The study accession number is PRJEB8245. The study unique name is ena-STUDY-CHALMERS-19-01-2015-13:42:21:838-352. The study title is Metagenomic sequencing revealed altered microbiota in microscopic colitis.

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