

ABSTRACT

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Title: Sexual dimorphism of rat gut microbiota composition and intestinal immunity

Background and Aim: Many factors can influence the composition of gut microbiota and the immune system. It is well-known that one of those factors is sex. This sexual dimorphism can lead to a specifically adjusted treatment of diseases for different gender and nutritional interventions. This study focuses on analysing sexual differences in gut microbiota and intestinal immunity in adult rats.

Methods: Caecal content from 12-week-old female and male Wistar rats were collected and analysed by DNA-sequencing technique to characterize microbiota composition. ELISA test was performed to quantify the concentration of IgA in faeces and gut wash. Flow cytometry determined the concentration of IgA-coating bacteria in faecal samples.

Results: Metagenomic analysis revealed that female gender presents 1 phylum, 4 families, 13 genera, and 13 species which are not present in male rats. Only one male-specific colonization was observed at the species level. Quantitative analysis showed a higher proportion of *Firmicutes* phylum in males which was associated with higher *Lactobacillaceae* and *Lactobacillus animalis*. Female rats showed higher occurrence in *Verrucomicrobia* phylum associated with *Akkermansiaceae* and *Akkermansia muciniphila*, and *Bacteroidetes* phylum which was increased due to a higher proportion of *Prevotellaceae* – *Prevotella shahii*, *P. stercorea* and *Porphyromonadaceae*. Moreover, female rats displayed a significantly higher proportion of individual species *Roseburia faecis* and families *Ruminococcaceae*, *Oscillospiraceae*. No sexual differences in intestinal IgA nor in IgA-coated bacteria were observed.

Conclusion: Sexual dimorphism does occur in microbiota composition and diversity in rats. This fact should be considered in the treatment of diseases associated with a disruption in the intestine and also in designing preclinical intervention studies related to the intestinal examination.

Keywords: gut microbiota, intestine, immune system, rat, sexual dimorphism