Perturbation of neonatal microbial gut community by peripartum antibiotics leads to decreased weight gain in Wistar rats

Tulstrup, Monica Vera-Lise; Roager, Henrik Munch; Clement Thaarup, Ida; Frandsen, Henrik Lauritz; Frøkjær, Hanne; Licht, Tine Rask; Bahl, Martin Iain

Publication date: 2018

Document Version
Publisher's PDF, also known as Version of record

Link back to DTU Orbit

Citation (APA):
Abstract for International Human Microbiome Congress (IHMC)
26th – 28th June 2018, Killarney, Ireland

Title: Perturbation of neonatal microbial gut community by peripartum antibiotics leads to decreased weight gain in Wistar rats

Authors: Monica Vera-Lise Tulstrup¹,², Henrik Munch Roager¹,³, Ida Clement Thaarup¹, Henrik Lauritz Frandsen¹, Hanne Frøkiær², Tine Rask Licht¹, Martin Iain Bahl¹

¹National Food Institute, Technical University of Denmark, Kgs. Lyngby, Denmark
²Department of Veterinary and Animal Sciences, Faculty of Health and Medical Sciences, University of Copenhagen, Frederiksberg C, Denmark.
³Department of Nutrition, Exercise and Sports, Faculty of Science, University of Copenhagen, Frederiksberg C, Denmark.

Background and purpose: Inter-generational transmission of bacteria during birth initiates the natural successional development of the child’s intestinal microbiota. This process can be disrupted by antibiotic exposure, potentially affecting early life microbiota-dependent metabolic programing. In the present study, we specifically investigated the metabolic consequences of exposing neonate Wistar rats to an antibiotic perturbed low-diversity microbiota from birth until weaning, without exposing the offspring directly to antibiotics.

Methods: Pregnant rats were administered daily with therapeutic doses of amoxicillin, vancomycin or water by oral gavage from 8 days before delivery until weaning (n=10-12/group). Weight gain in pups as well as successional development of intestinal microbiota, serum bile acids and colonic gene expression profiles related to appetite regulation was assessed at two, four and fourteen weeks of age by 16S rRNA gene sequencing, LC-MS and qPCR.

Results: Offspring from both amoxicillin and vancomycin treated dams gained less weight than controls, which persisted into adulthood even though initial differences in gut microbiota had subsided. This was concordant with lower feed intake as well as colonic up-regulation of the satiety hormone PYY gene, down-regulation of the bile acid receptor TGR5 gene and decreased levels of caecal SCFA levels in 4 weeks old offspring. Results are consistent with recent studies substantiating a microbial impact on early-life metabolic programing and provide new knowledge concerning potential risks associated with antibiotic administration during pregnancy.
Conclusion: We demonstrate that early-life exposure to an antibiotic perturbed low-diversity microbiota is sufficient to cause changes in body weight persisting into adulthood.