



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

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

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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 programming. 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 programming 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.