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The microbiome is known to impact nearly every aspect of host physiology in health and disease, as it has a substantial effect on metabolic function. Vertical transmission from mother to child can affect the physiology from one generation to the next when changes in the composition of the microbiota have occurred due to maternal diet or obesity.

Our objective was to study whether obesity or thinness during gestation and lactation would impact different maternal microbiota and whether the transfer of microbiota to the newborn would modify feeding behavior, independently of the metabolic alterations of the mother.

By using transplantation of vaginal, fecal, and milk-derived microbiota from OP and OR dams, which differed in taxonomic composition, into pups born to conventional Fischer F344 dams from birth to day 15 of life we demonstrated the programming of offspring feeding behaviour. Homeostatic and non-homeostatic regulation of food intake were investigated on young and mature animals.

Through metagenomic, metabolomic and transcriptomic approaches we search to identify markers or microbiota signatures associated to eating behaviour characteristics.

Early transfer of maternal microbiota was associated with specific feeding behavior traits that predisposed F-OP rats to a higher risk of overconsumption in later periods of life. The metagenomic analysis allowed us to identify a few species and the corresponding metagenomic functions were positively or negatively associated with the alteration of food intake parameters and cerebral functional pathways.

These results support the idea that neonatal transfer of gut microbiota can program feeding behavior, probably by acting early in life in shaping brain structures.