Microbiome of baby's first stool is associated with overweight at age 3 years

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New research presented at this year's European Congress of Clinical Microbiology & Infectious Diseases (ECCMID) in Amsterdam, Netherlands (13-16 April) shows that the early microbiome (population

of gut bacteria) in newborn babies is able to predict the risk of the child subsequently becoming overweight. These gut bacteria can also be affected by maternal antibiotic use during pregnancy.

The study by Dr. Katja Korpela of the PEDEGO Research Unit and Medical Research Center Oulu, University of Oulu, Oulu, Finland, and colleagues aimed to determine the association between the early intestinal microbiome and the subsequent growth and weight gain of children up to the age of three.

The early microbiome is important for the maturation of the gut and subsequent metabolic programming; a process of early adaptations to nutritional stresses or stimuli, which permanently change the physiology and metabolism of the child. An association between the administration of antibiotics during infancy, and the likelihood of a child later being overweight had been observed in previous epidemiological studies, suggesting that changes to the early microbiome could have long-lasting effects.

The team conducted a population-based cohort study comprising 212 consecutive newborn babies and collected the first-pass meconium (the first stool produced by an infant, comprising material ingested while in the uterus) as well as a follow-up stool sample at one year. Children had their weight and length/height measured at regular visits and records were taken of any antibiotic use after birth.

Genetic sequencing was then used to determine the species and relative abundance of bacteria in the stool samples.

Infants who received a course of antibiotics in their first year had a lower abundance of Actinobacteria at age one than infants who had prenatal antibiotic exposure or were given the drug shortly after birth. They also had a smaller Actinobacteria population than children who had

not been exposed to any antimicrobial substances, demonstrating the long-lasting impact of antibiotics on a child's microbiome.

Newborns who later became overweight by the age of three had a much higher (29% vs 15%) relative abundance of Bacteroidetes phylum (a large group of bacteria found in a wide range of environments, as well as in the gut and on the skin of many animals) in their microbiome. These overweight children also had a lower relative abundance of Proteobacteria (19% vs 35%). The abundance of Staphylococcus in meconium was discovered to be inversely associated with body length at one year, and height at two years of age.

A further analysis of the results using computer algorithms found that, while the population of gut bacteria at one year of age was not useful in trying to predict the likelihood of a child becoming overweight, the microbiome of the first stool, formed in utero during the fetal period, was linked to the risk of excess weight gain by the age of three.

The authors conclude: "The microbiome of the first stool, formed in utero during fetal period, was associated with subsequent overweight at the age of three years."

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