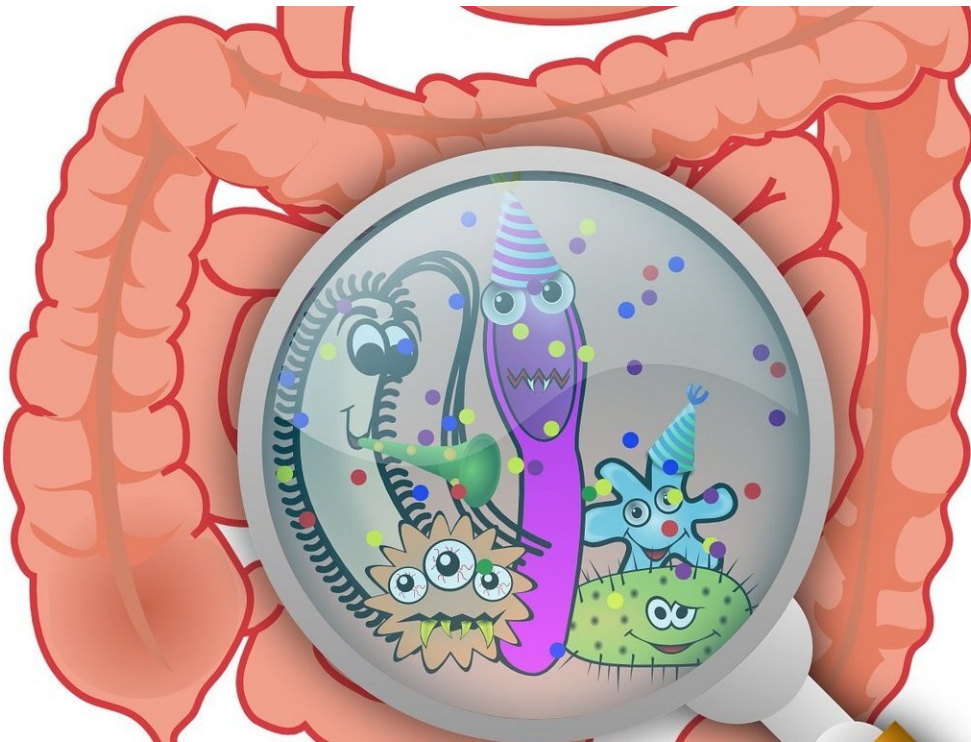# Gut microbiota of infants predicts obesity in children

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Credit: CC0 Public Domain

Evaluating the gut microbiota of infants may help identify children who are at risk for becoming overweight or obese, according to results from a recent study published in *mBio*. The research revealed that gut microbiota composition at 2 years of life is associated with body mass index (BMI) at age 12. In addition, the BMI at age 2 was not

significantly higher in children who later became overweight/obese, indicating that gut microbiota composition may be the earliest warning sign for detecting obesity.

"Our study provides more evidence that the gut microbiota might be playing a role in later obesity," said lead author Maggie Stanislawski, Ph.D., who is a research associate at the LEAD Center, University of Colorado Anschutz Medical Campus, Colorado School of Public Health, Aurora, Colorado. "If our findings can be confirmed by other studies, the gut microbiota might play an important part of the obesity prediction algorithm, to identify at-risk kids early in life, before they start to gain any excess weight that might put them at risk for later obesity."

Prior to this study, a growing body of evidence has demonstrated that the gut microbiota plays a role in obesity, and there is some evidence that the role might be causal. To shed more light on the issue, the University of Colorado researchers collaborated with Merete Eggesbø, MD, Ph.D., who leads the NoMIC study at the Norwegian Institute of Public Health in Oslo, and analyzed data from 165 infants who had BMI measured at 12 years.

The NoMIC study began in 2002 as one of the earliest birth cohorts in the world to investigate the early life gut microbiome and includes roughly 550 kids who are now teenagers. The study recruited moms and infants in the hospital at the time of delivery. At 12 years of age, 20% of the 165 children in the study cohort were overweight or obese.

The researchers compared the BMI at age 12 with gut microbiota samples from six time points throughout their childhood, at day 4, day 10, one month, four months, one year, and two years. They performed 16s rRNA gene sequencing on the gut microbiota samples. "We looked at whether there were specific taxa that were predictive of later BMI at each time point," said Dr. Stanislawski.

The researchers found qualitative differences in the composition of children's gut microbiota at day ten and at two years that were associated with BMI z-scores at age 12. BMI z-scores are measures of relative weight adjusted for child age and sex. They also examined how much of the variation in childhood BMI z-scores was explained by the early gut microbiota taxa.

"At the early time points, there was somewhat of a relationship between the gut microbiota taxa and later BMI, but the relationship was much stronger as the kids got older," said Dr. Stanislawski. "At one year, it was stronger than the earlier time points. At two years, it was the strongest. We found this very interesting because, at two years, there wasn't any obvious phenotype in terms of whether or not the kids were going to become obese. Kids who became obese later in life didn't have high BMI z-scores at age 2. The findings suggest that the gut microbiota phenotype was present before any overt sign of overweight or obesity. Since the gut microbiota is influenced by diet, this association could also reflect dietary choices that are precursors to obesity."

Dr. Stanislawski said the study was limited in that the entire cohort was of Norwegian descent. This research, she said, needs to be repeated in other cohorts, but if replicated, it may lead to a new tool to identify kids at risk for developing obesity. "It is better to identify at-risk kids early. It is easier to prevent obesity than to reverse it," said Dr. Stanislawski. "It's possible that if we follow up some of these findings in the lab, it will reveal more about the pathophysiology of obesity as well."

The study also exposed a potential health caution. The researchers found that some gut microbes that are generally thought to be healthy in both children and adults were associated with higher childhood BMI. This highlights that we do not fully understand the dynamics of the gut colonization process.

"When I was pregnant, my doctor suggested giving the baby probiotics every day, and I think a lot of people are giving their infants probiotics," said Dr. Stanislawski. "However, it might not be the best idea to give babies the same types of bacteria every day, particularly in very early life when overloading the gut with one or two strains may prevent colonization with other types of important bacteria." She pointed out that one way to improve the gut microbiota in kids and adults is to eat a well-balanced diet with lots of different types of vegetables and fiber, so there are lots of things feeding the gut microbiota.

Future research will focus on further examining the colonization process in relation to other markers of metabolic health in children. "We will focus on the temporal dynamics of first two years," said Dr. Stanislawski.

Provided by American Society for Microbiology

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