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Press release
For immediate release

Gut detectives at work: decoding dietary habits from DNA evidence
DNA fragments in stool samples for nutritional research

Graz, 25 February 2025: "Tell me what you eat and I will tell you who you are"—this well-known saying accurately describes the new MEDI method for decoding dietary habits from DNA fragments that was developed at Med Uni Graz in cooperation with an international research team. The novel technique called MEDI (metagenomic estimation of dietary intake) opens up completely new avenues in nutritional research—and without using any questionnaires or food diaries, which are prone to errors.

MEDI: More precise dietary findings using DNA analysis

MEDI is based on metagenomic sequencing, a method that has been used above all to analyze microorganisms in the gut. Medical University of Graz scientists developed MEDI in collaboration with colleagues from the Institute for Systems Biology in Seattle, USA. The method detects food-derived DNA in stool samples and thus provides a detailed picture of food and nutrients that were consumed.

"For decades, the nutritional sciences have relied on questionnaires, which require great concentration and a good memory. But who knows exactly how many strawberries they ate the day before yesterday or if they had one or two glasses of wine?" says Christian Diener from the Med Uni Graz Diagnostic and Research Institute of Hygiene, Microbiology and Environmental Medicine, who is the first author of the study. "MEDI provides an objective alternative by identifying traces of DNA from food in stool samples—with impressive agreement with known nutritional data."

Detecting food without questionnaires

MEDI can detect over 400 different foods using a DNA database with more than 300 billion base pairs. The method has proven its worth in tests on children and adults and in two controlled dietary studies. "We have found food DNA in the tested samples in over 99% of cases. Using MEDI, it's possible for us to sequence food DNA, even if it makes up less than 0.0001% of the total DNA contained in the sample," explains Christian Diener concerning the new method.
The foods determined by the traces of DNA are converted into detailed nutrient profiles that reflect the intake of protein, vitamins and other nutrients exactly.

In a study of over 500 subjects, MEDI was able to identify food and nutrients that are associated with an increased risk of metabolic syndrome—and without any nutritional questionnaires. "Our findings show how we can measure dietary habits and the gut microbiome at the same time," says study co-author Sean Gibbons of the Institute for Systems Biology in Seattle, USA. "This provides us with new knowledge of individual reactions to food and potential health risks," adds Christian Diener.

The researchers see great potential for using MEDI in clinical and epidemiological studies. This method could help to personalize dietary recommendations, improve dietary interventions and better understand the influence of diet on gut health—and all this without elaborate documentation, with just a simple stool sample. "The simultaneous detection of microbes and food in stool samples could help identify foods that encourage infection in the gut or help develop personalized dietary plans that optimize the restoration of gut flora following antibiotic treatment," predicts Christian Diener.

To the publication

Metagenomic estimation of dietary intake from human stool
Nature Metabolism
https://www.nature.com/articles/s42255-025-01220-1

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