First gut bacteria may have lasting effect on ability to fight chronic diseases

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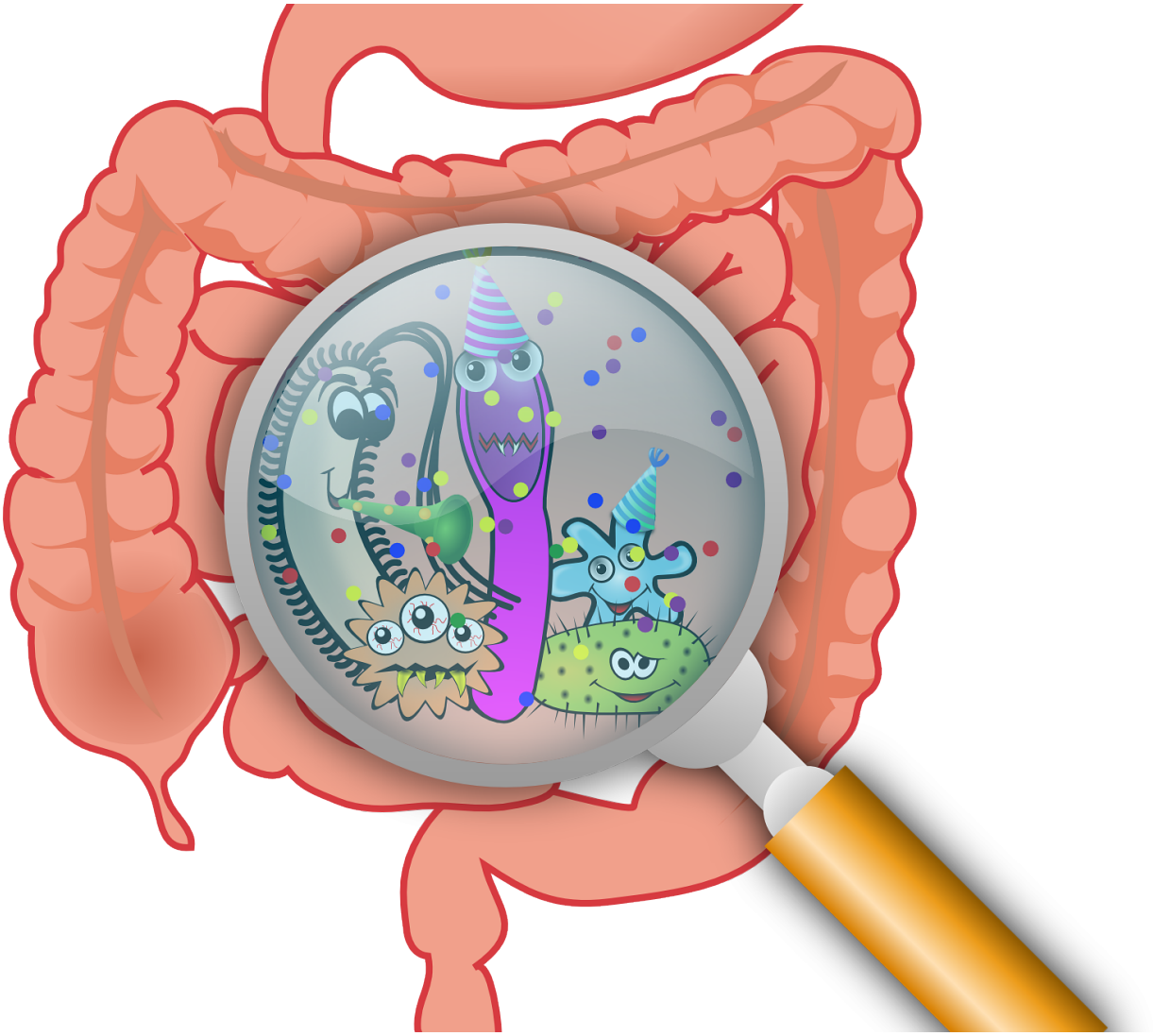

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New research showing that the first bacteria introduced into the gut have a lasting impact may one day allow science to adjust microbiomes—the one-of-a-kind microbial communities that live in our gastrointestinal tracts—to help ward off serious chronic diseases.

Findings by U of A microbial ecologist Jens Walter and his colleagues suggest differences in our microbial makeup likely depend on when we acquire our first microorganisms after birth—and the order they arrive in our gut has a lasting impact on how the microbiome looks when we grow up.

The discovery sheds new light on how these microbiomes, which are as personal as fingerprints, establish themselves and what drives their unique nature. That's key to figuring out how to change our microbiomes for the better, said Walter.

"Each of us harbours a microbiome that is vastly distinct, even for identical twins. Microbiomes are important for our health, but they appear to be shaped by many unknown factors, so it's hugely important to understand why we are all different," he said.

Studies have already shown that a person's genetics, diet, environment, lifestyle and physiological state all make small contributions to the variation of the gut microbiome. But those factors account for less than 30 per cent of the variation, noted Walter.

In the study, researchers introduced distinct microbial communities, collected one at a time, from adult mice into the gastrointestinal tracts of young, genetically identical mice. The results showed that the microbiome in the adults was more similar to the microbiome introduced first. Even using a cocktail of four different bacteria, the researchers repeatedly found that the first microbes showed the highest level of persistence and the strongest influence on how the gut microbiome

developed.

The discovery about timing brings scientists one step closer to understanding how microbiomes might become disrupted—for example, through caesarean section birth or antibiotic use—which is then more likely to predispose us to chronic diseases, and how to potentially address that.

Poor gut health has been linked to obesity, Type 2 diabetes, heart disease, inflammatory bowel disease, colon cancer, neurological disorders, autism and allergies.

"If we know what drives specific microbiomes in specific people, we can have a much more rational approach to potentially altering the microbiome, and developing strategies to address those diseases," Walter said.

"Having long-term persistence of microbes when they colonize in the gut early in life means that a health-promoting biome could potentially be established by introducing beneficial bacteria straight after birth."

Baby formulas fortified with probiotics already do this to a degree, but knowing more about how probiotics affect other members of the gut's microbial community could take it to the next level, he said.

"We could be a lot more systematic. I think in 30 or 40 years we'll be able to colonize infants with specific bacteria we know are health-promoting and shape the microbiome in a beneficial way."

More information: Inés Martínez et al, Experimental evaluation of the importance of colonization history in early-life gut microbiota assembly, *eLife* (2018). DOI: 10.7554/eLife.36521

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