The climate change within—missing microbes and the evolution of the microbiome

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As a physician and microbiologist, Blaser has studied the human microbiome for more than 20 years. Credit: Rutgers University

The human microbiome – that invisible world of bacteria, viruses and fungi in and on our bodies – has been relatively unstudied even though

scientists have known about it for centuries. But thanks to researchers like Martin Blaser, the world of science and medicine is starting to pay closer attention.

"There is an ecological problem – climate change – now happening inside of us," said Blaser, a pioneer in the field and the new director of the Center for Advanced Biotechnology and Medicine at Rutgers Biomedical and Health Sciences. "There's a lot of discussion about climate change in the world but very little about a parallel process happening within us as our modern lifestyle affects the microbes that live inside us."

Blaser discusses how his work will help researchers and clinicians to better understand the benefits of the microbiome and how it can be harnessed and protected to promote human health.

Why should people care about the microbiome?

Blaser: We all have a microbiome – every human, animal, plant – that's been around for a very long time. For eons, it's served many functions, including training our immune system to do its work, and our brain in how to think and assistance to our bodies to digest food, absorb vitamins and defend against invaders.

It has also changed drastically in developing countries like the United States, specifically in early childhood when babies develop their lifelong patterns of immunity and metabolism. Over the last century, our microbiome has been depleting, losing some of the ancestral microbes which may be leading to major diseases and epidemics such as obesity, asthma, food allergies, diabetes, inflammatory bowel disease and cancer.

What is threatening the microbiome, causing it to

change so much?

Blaser: As a whole, the public will try anything to attain and maintain a healthy lifestyle, but some modern-day practices intended to improve health and medicine are over-used and may actually be doing more harm than good. These threats include the very widespread over-usage of antibiotics, C-sections, use of baby formula over breast milk and antibacterial products.

Antibiotics are the number one threat to our microbiome, but it's complex because while they are a pillar of modern life, almost all children are receiving multiple courses in the first few years of life. Every time a child takes a dose of an antibiotic, doctors need to account for the cost-benefit of the antibiotics and how it may be increasing the risk of other diseases. We need to educate medical professionals to understand that every prescription has a cost and question whether it is absolutely necessary.

Infants' microbes are threatened when they are delivered via C-section or given formula as opposed to breast milk. Every generation hands over their microbiome to the next as the baby passes through the birth canal, but babies born through C-section lack that transfer. At some point early in life, babies will then be given their first course of antibiotics. It takes a while for the microbiome of babies born by C-section to normalize and in that time when the brain and immune system develops, they become more at risk for developing obesity, celiac disease and juvenile diabetes.

Next, babies fed formula receive important nutrients such as calories and calcium, but they're missing the micronutrients that breast milk has evolved to contain. As a result, the microbiome is altered in ways that could increase the later risk of obesity, asthma, and allergies.

The last major threat is the use of antibacterials, whether it be soaps or

hand gels, as they get rid of the 'good' germs as well as the 'bad.' We need the good germs to help our bodies defend against the bad, but with antibacterials we are washing everything away."

What can people do to maintain their health and influence of their microbiome?

Blaser: Each person, especially parents of young children, should consider the benefits and risks associated with the use of antibiotics, C-sections, baby formula and antibacterials, and question whether they are completely necessary. For example, question your doctor if you are prescribed an antibiotic. The illness may resolve itself just as well on its own without it. Sometimes, C-sections and formula feeding are medically necessary, but if there is a choice, women should opt for vaginal delivery and feeding their infant with breast milk. Lastly, rather than buying antibacterial soaps, consider washing with plain soap and water instead. Any benefits from antibacterial soaps have not been proven, despite their widespread marketing.

Provided by Rutgers University

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