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COMMENTARY

Artificial sweeteners are not sweet to the gut microbiome

Most cells in our body are not human, but microbial; the ratio of ‘them’ to ‘us’ is about 10:1.¹ Perturbations of host-microbe interactions can lead to miscues and altered host responses that increase the risk of pathogenic processes and promote “western” disorders, such as obesity, diabetes, cancers, allergies, autism, asthma and inflammatory bowel diseases.^{2,3} In theory, dietary components can affect the equilibrium between intestinal microbes and the host, leading to altered physiology. A recent report in *Nature*⁴ provides additional evidence to support this theory, where it was found that the use of artificial sweeteners enhanced the risk of glucose intolerance in both mice and humans by altering the composition and behavior of the intestinal microbiota. Notably, changes of the bacterial Taxa (an over-representation of Bacteroides and an under-representation of Clostridiales) following the consumption of artificial sweeteners was previously found to be associated with type 2 diabetes⁴ and other chronic diseases.⁶

This study in *Nature*⁴ provides a plausible explanation for the link between human health and the changing diet, demonstrated through a unique mechanism that shows how the use of artificial sweeteners impacts the host physiology and metabolism and decreases beneficial bacterial species, thus increasing the risk for obesity and type 2 diabetes in genetically susceptible hosts. These findings are relevant to many complex disorders, as well as other “new age” disorders, such as inflammatory bowel diseases, diabetes, metabolic syndrome and cancers, where the disturbed relationships among the lifestyle, genetics and the enteric microbiota have been implicated.

The study by Suez, et al⁴ helps to explain the upward trend in complex disorders, such as obesity, diabetes, allergy, and asthma, over the past half century, which may be related to changes in the diet, lifestyle [such as less outdoor activity (sun exposure) and more time indoors], and

the human microbiomes that negatively impact individuals with genetic susceptibility.

The public is aware of the alarming trends in diseases such as obesity, diabetes, inflammatory/immune disorders, and cancer. Many people are sensitive to the notion that these diseases are the consequences of our changing environment, diet and lifestyle. What the public wants to know is what factors cause these diseases, and how they can make changes to prevent/treat these conditions. The recent findings linking artificial sweeteners to dysbiosis and metabolic abnormalities call for a reassessment of the massive use of artificial sweeteners. This is because the diet can rapidly modulate the gut microbiota,⁵ and alterations in the microbiota exert profound effects on the host physiology and metabolism. These findings may serve as a basis for personalized nutrition strategies to restore the microbial states associated with health.

The enteric microbiota is malleable. However, we have realized that reaching for the high-hanging fruit, where biomedical discoveries related to the microbiome lie, requires a multi-disciplinary team effort from basic, translational, and clinical investigators and close attention to the current public health challenges.

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