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Low/No Calorie Sweeteners Influence on Gut Microbiota and Interactions of Microbiota with Stevia

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Ian graduated with a BSc (Hons, First Class) and PhD in microbiology from University College London a long time ago. Prior to joining the University of Reading in 2007 as the Hugh Sinclair Professor of Human Nutrition, he was head of nutrition at the University of Ulster and Director of the Northern Ireland Centre for Food and Health. Currently, he is Editor in Chief of the European Journal of Nutrition. His main research area is the interaction of diet, gut microbiota and health with a particular focus on the metabolism of phytochemicals and impact on health. In 2005 he was awarded an honorary doctorate from the University of Gent in Belgium for his work on nutrition and cancer. He has published over 400 papers and is on the Thompson-Reuters List of Most Highly Cited Researchers 2016.

ABSTRACT

The human colonic microbiota is a large and complex microbial community. In total, over 1000 bacterial species have been identified of which many remain uncultured, with about 160 species being found in the gut of any individual. The size and diversity of the microbiota is reflected in its extensive metabolic activities which complement and extend those of mammalian enzymes.

Observational studies comparing the faecal microbiotas of healthy subjects with those of patients, strongly suggest that the gut microbiota plays a significant role in the aetiology and/or development of a range of gastrointestinal diseases and may also be involved in obesity and diabetes, although the precise organisms involved are difficult to identify. The microbiota is a very dynamic ecosystem and its composition and activities are influenced by a variety of endogenous and exogenous factors particularly diet.

Because of their extensive use in foods, the interactions of low/no calorie sweeteners (LCNS) and gut microbiota has been the subject of numerous studies in laboratory animals and human subjects, although LNCS are consumed at such low levels that they are unlikely to have a clinically meaningful impact on the gut microbiota. Nevertheless, a few studies on saccharin have shown effects on microbiota composition or metabolism, but only at very high doses above normal human consumption. Studies with other LCNS show either no, or inconsistent, effects on the microbiota, probably as a consequence of design issues and lack of adequate controls. Overall, the evidence indicates that LCNS, including Stevia, have minimal impact on gut microbiota.

Approved LNCS are a structurally diverse group of compounds that have very different metabolic fates following consumption. Most (e.g. acesulfame K, saccharin, and sucralose) are not metabolized by gut bacteria. Stevia in its glycosidic forms (such as rebaudioside A and stevioside) is a notable exception. The glycosides pass unabsorbed through the upper gastrointestinal tract and enter the colon where the sugars are sequentially removed by the gut microbiota, releasing steviol, which is then absorbed intact without further bacterial metabolism. While the gut microbiota actively acts upon steviol glycosides, limited research exists on the impact of steviol glycosides on the gut micobiome at the levels consumed in the diet.