

Invited Speaker Abstract

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Title of Presentation

Low calorie sweeteners and gut microbiota: a review of animal and human studies

1. Abstract

The human colonic microbiota is a large and complex microbial community. Over 1000 bacterial species have been identified with about 160 being found in the gut of any individual. The size and diversity of the microbiota is reflected in extensive metabolic activities.

Observational studies comparing the faecal microbiotas of healthy subjects with those of patients, strongly suggest an association of gut microbiota composition and the aetiology and/or development of a range of gastrointestinal diseases and also a link with obesity and diabetes. However, the precise organisms involved are difficult to identify.

The interactions of low/no calorie sweeteners (LNCS) and gut microbiota has been the subject of numerous studies in laboratory animals and human subjects. 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 is a notable exception as its glycosidic forms are hydrolysed by the microbiota, releasing steviol, which is then absorbed intact without further bacterial metabolism.

LNCS are consumed at such low levels that they are unlikely to have a direct, clinically meaningful impact on the gut microbiota. Nevertheless, some studies on saccharin (mostly in laboratory animals) have shown effects on microbiota composition or metabolism, although only at very high doses above normal human consumption. Studies with other LNCS 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 LNCS have minimal impact on gut microbiota.

2. key references

1. Rowland I et al. Gut microbiota functions: metabolism of nutrients and other food components. *Eur J Nutr* 2018; 57: 1-24
2. Lobach AR et al. Assessing the in vivo data on low/no-calorie sweeteners and the gut microbiota. *Food Chem Toxicol* 2018; 124: 385-399
3. Ruiz-Ojeda FJ et al. Effects of Sweeteners on the Gut Microbiota: A Review of Experimental Studies and Clinical Trials. *Adv Nutr* 2019; 10: S31-S48

3. key messages

- Differences in human gut microbiota are associated with health (esp. gastro-intestinal tract disorders), but evidence for causal links with metabolic syndrome and obesity are limited.
- Most studies of LNCS on microbiota are in mice and rats, but effects are small and confounded by inadequate control groups and lack of dietary control.
- There are few human studies on LNCS and microbiota and effects are inconsistent and difficult to interpret due to lack of dietary control or assessment, lack of control groups.

