

# Low-Calorie Sweeteners and Weight Management: What Does the Future Hold?


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One of the foremost questions in the obesity field is whether low-calorie sweeteners (LCSs) assist or hinder weight management. Weight loss and weight loss maintenance are desired by consumers, who spend billions to achieve these goals. LCSs allow the food industry to sweeten foods and beverages, ensuring acceptable taste without adding additional calories or negative health effects associated with added sugar. While substituting LCSs for added sugar seems like a positive idea, researchers have found that although most LCSs are calorie free, they are not inert. They are believed to have numerous effects on the gut, taste, metabolism, and body weight. Thus, the purpose of this *Obesity* supplement issue is to examine the current state of science regarding LCSs to help navigate future research. It is imperative to better understand the weight management and cardiometabolic effects of artificial sweeteners to help guide their incorporation into dietary patterns during weight loss and weight maintenance.

In the late 1800s, the first artificial sweetener, saccharin, was discovered. Its use increased during World Wars I and II when sugar was rationed. Since that time, LCSs have become a larger part of the American diet. Diet soft drinks were formulated in the 1950s and became popular in the 1980s. However, in the mid- to late 1900s, it was found that high doses of artificial sweeteners, including saccharin, aspartame, and sucralose, were linked to cancer in rodents. Although saccharin may cause bladder cancer in rodents, the mechanism is strictly limited to rodents and does not apply to humans (1). Findings linking aspartame and sucralose to cancer were found to be unsubstantiated (2,3), yet the false perception of LCSs contributing to cancer has continued through the years.

Currently, there are six high-intensity sweeteners that are approved by the Food and Drug Administration. The sweeteners include acesulfame potassium (Ace-K; Sweet One), advantame, aspartame (NutraSweet, Equal), neotame (Newtame), saccharin (Sweet'N Low), and sucralose (Splenda) (4). Also, *Siraitia grosvenorii* Swingle (luo han guo) fruit extracts (SGFE, Nectresse) and high-purity steviol glycosides (Truvia) have submitted notices for generally-recognized-as-safe status (5). These sweeteners are both man-made and natural. The Food and Drug Administration has continued to approve use of these high-intensity sweeteners in moderation, typically with an acceptable daily intake in milligrams per kilogram of body weight. Currently, there are no warning labels associated with their use. The LCS cyclamate(s) is not available in the United States but is prominent in many other places across the world, including the European Union.

The Obesity Society Preconference at ObesityWeek 2017 featured four talks that examined the effects of LCSs on taste preference, metabolism, and energy intake from basic, clinical, and epidemiological perspectives (6-9). These researchers clarified what was known on the topic as well as critical areas of future exploration. Although the preconference

discussed all LCSs, the focus was on noncaloric sweeteners. Sugar alcohols are also considered LCSs but contain energy. Current dietary guidelines suggest that products that incorporate LCSs acutely decrease energy intake, but it is unknown whether they maintain these beneficial effects over the long term. The US Department of Agriculture Dietary Guidelines (10), American Heart Association (11), and World Health Organization (12) recommend limiting added sugars, as they are not part of a healthy eating pattern. LCSs would be an easy exchange. Of note, the US Department of Agriculture and World Health Organization partially based their added sugar recommendations on dental caries outcomes. Most research suggests that LCSs do not increase the incidence of dental caries. Thus, compared with added sugar, LCSs provide beneficial effects for dental caries. Yet, especially compared with water or other nutrient-dense foods and beverages, effects of LCSs on body weight and overall cardiometabolic health outcomes require further investigation in a variety of study populations. This special issue based on the The Obesity Society Preconference can serve as a stepping stone to help answer the next set of critical questions regarding LCSs and weight management. 

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