

WHO's recommendation against the use of artificial sweeteners for weight loss leaves many questions unanswered

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Do low-calorie sweeteners help with weight management? And are they safe for long-term use?

This is among the most controversial topics in nutritional science. In early May 2023, the World Health Organization issued a statement that cautions [against the use of nonsugar sweeteners](#) for weight loss except for people who have preexisting diabetes.

The WHO based its new recommendation on a [2022 systematic review and meta-analysis of scientific studies](#) on nonsugar [sweetener](#) consumption in humans. This type of study reviews a large body of research to draw a broad conclusion.

Based on its interpretation of that large-scale review, the WHO recommended [against using artificial sweeteners for weight control](#) and concluded that there may be [health risks](#) associated with habitual consumption of nonsugar sweeteners over the long term. However, the WHO also acknowledged that the existing evidence is not conclusive and that more research needs to be done.

As neuroscientists, we study how dietary factors such as sweeteners affect the brain's ability to perform critical functions, including metabolism, [appetite](#), and [learning and memory](#).

We found the WHO's advisory surprising based on the study's equivocal results. Determining the answers to these questions is immensely challenging, and [public health](#) messaging around recommendations can send mixed messages.

'Healthy' versus 'unhealthy' sugars

Natural sugars like glucose and fructose, together with fiber and other nutrients, are found in many [food sources](#) that are considered healthy, such as fruit. However, these simple carbohydrates have been increasingly added into manufactured food products, especially beverages. Sugar-sweetened beverages are usually high in calories and

offer little else in the way of nutrition.

In the early 20th century, food and beverage manufacturers began incorporating naturally and chemically derived substances that satisfy sweet cravings but contain significantly fewer calories than [natural sugars](#)—and, in some cases, zero calories. Sugar substitutes became particularly widespread in the 1950s with the increasing popularity of diet sodas. Since then, consumers have [increasingly turned to these sugar substitutes](#) in their everyday lives.

Sugar substitutes go by many names, including high-intensity sweeteners, [artificial sweeteners](#), nonnutritive sweeteners, [low-calorie sweeteners](#) and, as termed in the WHO report, nonsugar sweeteners." These include synthetic compounds like sucralose, acesulfame potassium and aspartame, and naturally derived ones, such as those from the plant *Stevia rebaudiana*, among many others.

Each nonsugar sweetener has a unique chemical structure, but they all activate sweet taste receptors at very low concentrations. This means that you need to add only a tiny amount of them to sweeten your coffee or tea, as opposed to heaping spoonfuls of natural sugar.

Sugar substitutes and the quest for weight loss

Obesity and its associated metabolic conditions, like diabetes and cardiovascular disease, are now among the leading [causes of preventable death](#) in the U.S. The [obesity epidemic](#) has been linked in part to an increase in added sugar consumption over the past century.

In order to help address it, in 2015 the [WHO issued specific recommendations](#) to reduce sugar intake and adopt healthier diets.

But humans are hard-wired to find the [sweet taste of sugars pleasurable](#),

and the tastiness of real sugar makes it difficult for most of us to remove it from our diets.

Sugar substitutes were designed to help. The math seems straightforward: Replacing your favorite 12-ounce sugar-sweetened beverage that contains 150 calories with an artificially sweetened beverage of the same volume that contains zero calories should allow you to reduce the number of calories you take in each day and reduce your body weight over time.

But the science is not so straightforward. Research from [both animal models and humans](#) indicates that [habitual nonsugar sweetener consumption](#) can lead to [long-term negative metabolic outcomes](#) and [body weight gain](#).

However, there are conflicting studies from [animal models and humans](#) that have not found significant body weight gain associated with nonsugar sweeteners consumption.

Parsing the health impacts

Regardless of any potential benefits nonsugar sweeteners may have for [weight control](#), their use must also be considered in the context of overall health.

Agencies like the WHO and the U.S. Food and Drug Administration periodically review available evidence and assess the safety of various food additives, including nonsugar sweeteners, for use in foods and beverages within what is called an [acceptable daily intake](#) limit. In this context, the acceptable daily intake is based on the estimated amount of a specific nonsugar sweetener that can be safely consumed daily over one's entire life without adverse effects on health.

Each agency sets its own daily allowance based on the best available data. But because these experiments cannot account for all possible conditions in which these substances are used in real life, it is critical that scientists continue to investigate the health effects of food additives.

The authors of the WHO report relied on three main types of published research studies to determine whether nonsugar sweetener consumption was linked to adverse health effects. The gold standard for assessing causation is what are called [randomized controlled trials](#).

In these studies, people are randomly assigned to either an experimental group—which receives the experimental substance, such as a nonsugar sweetener—or a [control group](#)—which receives a placebo or different substance. Participants in both groups are then tracked for a period of time, typically weeks or months. The majority of studies involving randomized controlled trials on nonsugar sweeteners to date involve this type of comparison, with nonsugar sweeteners replacing consumption of natural [sugar-sweetened beverages](#).

The analysis of almost [50 randomized controlled trials](#) on which the WHO based its recommendation found modest benefits of using nonsugar sweeteners for weight loss and determined that the habitual use of those nonsugar sweeteners did not lead to diabetes symptoms or indicators of [cardiovascular disease](#). But it did find that the use of nonsugar sweeteners was associated with a higher ratio of total cholesterol to HDL, short for high-density lipoprotein, which is considered the "good cholesterol."

That means that habitual consumers of artificial sweetener had more of the low-density lipoprotein, or LDL version, in their system. That form of "bad cholesterol" is a [risk factor for heart disease](#).

However, other potential adverse consequences of consuming nonsugar

sweeteners may take more time to appear than can be identified in the limited time frame of a randomized controlled trial.

The authors also evaluated what are called prospective cohort studies. Those studies track participants' self-reported use of sweeteners alongside health outcomes, oftentimes over many years. They also took into account case-control studies, which identify people with or without a certain health issue, such as cancer, and then use available health records and interviews to determine the extent of nonsugar sweetener use in their past.

Examination of the cohort and case-control studies found that regular consumption of nonsugar sweetener was associated with increased fat accumulation, higher body mass index and increased incidence of [Type 2 diabetes](#). Those findings differ from the outcomes of the randomized control studies.

Analysis of the cohort and case-control studies also concluded that a history of regular nonsugar sweetener use was linked to increased frequency of stroke, hypertension, other adverse cardiovascular events and, in pregnant people, an increased risk for premature birth. The frequency of cancer in nonsugar sweetener consumers was very low in general, though [saccharin, an FDA-approved sweetener](#) found in many food products, was associated with a bladder cancer.

Caveats and takeaways

On the face of it, these results are alarming, but they need to be taken with a grain of salt. As the WHO report points out, these studies have significant limitations that need to be considered.

Take, for example, in the cohort and case-control studies, that higher [body mass index, or BMI](#), was associated with greater nonsugar

sweetener intake and poorer health outcomes. One possibility is that people with obesity used nonsugar sweeteners to help cut calories more than others without obesity. This makes it difficult to determine whether the disease is caused by sustained artificial sweetener use or by the other underlying conditions associated with obesity.

Additionally, the way nonsugar sweeteners are consumed is not controlled in these types of studies. So negative health outcomes could be associated with other affiliated harmful behaviors, such as more sugar or fat in the diet.

The picture is very mixed on both the benefits of nonsugar sweeteners for [weight loss](#) and their ties to adverse health issues. The WHO's recommendation seems to have weighed the cohort and case-control studies over the randomized controlled ones, a decision that we found puzzling in light of the limitations of these studies for assessing whether nonsugar sweeteners have a causal role in disease.

As with all health-related choices, the science is complex. In our view, grabbing a diet drink to offset the calories in a slice of chocolate cake every once in a while will likely not be harmful for your health or lead to a significant weight change.

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