

## **A review of the effectiveness of aspartame in helping with weight control**

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Strategies to reverse the upward trend in obesity rates need to focus on both reducing energy intake and increasing energy expenditure. The provision of low- or reduced-energy-dense foods is one way of helping people to reduce their energy intake and so enable weight maintenance or weight loss to occur. The use of intense sweeteners as a substitute for sucrose potentially offers one way of helping people to reduce the energy density of their diet without any loss of palatability. This report reviews the evidence for the effect of aspartame on weight loss, weight maintenance and energy intakes in adults and addresses the question of how much energy is compensated for and whether the use of aspartame-sweetened foods and drinks is an effective way to lose weight.

All studies which examined the effect of substituting sugar with either aspartame alone or aspartame in combination with other intense sweeteners on energy intake or bodyweight were identified. Studies which were not randomised controlled trials in healthy adults and which did not measure energy intakes for at least 24 h (for those with energy intakes as an outcome measure) were excluded from the analysis. A minimum of 24-h energy intake data was set as the cut-off to ensure that the full extent of any compensatory effects was seen. A total of 16 studies were included in the analysis. Of these 16 studies, 15 had energy intake as an outcome measure. The studies which used soft drinks as the vehicle for aspartame used between 500 and about 2000 ml which is equivalent to about two to six cans or bottles of soft drinks every day.

A significant reduction in energy intakes was seen with aspartame compared with all types of control except when aspartame was compared with non-sucrose controls such as water. The most relevant comparisons are the parallel design studies which compare the effects of aspartame with sucrose. These had an overall effect size of 0.4 standardised difference (SD). This corresponds to a mean reduction of about 10% of energy intake. At an average energy intake of 9.3 MJ/day (average of adult men and women aged 19–50 years) this is a deficit of 0.93 MJ/day (222 kcal/day or 1560 kcal/week), which would be predicted (using an energy value for obese tissue of 7500 kcal/kg) to result in a weight loss of around 0.2 kg/week with a confidence interval 50% either side of this estimate.

Information on the extent of compensation was available for 12 of the 15 studies. The weighted average of these figures was 32%. Compensation is likely to vary with a number of factors such as the size of the caloric deficit, the type of food or drink manipulated, and timescale. An estimate of the amount of compensation with soft drinks was calculated from the four studies which used soft drinks only as the vehicle. A weighted average of these figures was 15.5%. A significant reduction in weight was seen. The combined effect figure of 0.2 SD is a conservative figure as it excludes comparisons where the controls gained weight because of their high-sucrose diet and the long-term follow-up data in which the aspartame groups regained less weight than the control group. An effect of 0.2 SD corresponds to about a 3% reduction in bodyweight (2.3 kg for an adult weighing 75 kg). Given the weighted average study length was 12 weeks, this gives an estimated rate of weight loss of around 0.2 kg/week for a 75-kg adult.

The meta-analyses demonstrate that using foods and drinks sweetened with aspartame instead of sucrose results in a significant reduction in both energy intakes and bodyweight. Meta-analyses both of energy intake and of weight loss produced an estimated rate of weight loss of about 0.2 kg/week. This close agreement between the figure calculated from reductions in energy intake and actual measures of weight loss gives confidence that this is a true effect. The two meta-analyses used different sets of studies with widely differing designs and

controls. Although this makes comparisons between them difficult, it suggests that the final figure of around 0.2 kg/week is robust and is applicable to the variety of ways aspartame-containing foods are used by consumers.

This review has shown that using foods and drinks sweetened with aspartame instead of those sweetened with sucrose is an effective way to maintain and lose weight without reducing the palatability of the diet. The decrease in energy intakes and the rate of weight loss that can reasonably be achieved is low but meaningful and, on a population basis, more than sufficient to counteract the current average rate of weight gain of around 0.007 kg/week. On an individual basis, it provides a useful adjunct to other weight loss regimes.

Some compensation for the substituted energy does occur but this is only about one-third of the energy replaced and is probably less when using soft drinks sweetened with aspartame. Nevertheless, these compensation values are derived from short-term studies. More data are needed over the longer term to determine whether a tolerance to the effects is acquired.

To achieve the average rate of weight loss seen in these studies of 0.2 kg/week will require around a 220-kcal (0.93 MJ) deficit per day based on an energy value for obese tissue of 7500 kcal/kg. Assuming the higher rate of compensation (32%), this would require the substitution of around 330 kcal/day (1.4 MJ/day) from sucrose with aspartame (which is equivalent to around 88 g of sucrose). Using the lower estimated rate of compensation for soft drinks alone (15.5%) would require the substitution of about 260 kcal/day (1.1 MJ/day) from sucrose with aspartame. This is equivalent to 70 g of sucrose or about two cans of soft drinks every day.

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