Can we reduce snack food intake?1,2

George A Bray

Obesity is a major public health problem, and better strategies are needed to help prevent its development. When prevention fails, however, treatment may be needed, and it is this subject that Temple et al (1) have addressed in an article in this issue of the Journal. Many studies show that we can produce significant initial weight losses by using diet and behavioral programs (2–4), but many participants in these programs suffer from weight regain. Because the problem of obesity results from an imbalance between energy intake and energy expenditure over an extended period of time, understanding how to help individuals change their eating behavior to reduce this energy intake is a central issue if we are to be effective over the long term in redressing energy imbalance.

Evidence from several sources suggests that the quantity of food eaten, and thus the energy content of our diets, has increased over the past 50 y, and that this may be the major factor in the development of obesity (5). The report by Hill et al (6) estimated that the energy needed for the current increase in weight was ≈100 kcal/d. For children, Wang et al (7) provided an estimate of 150–175 kcal/d. Estimates for the rise in energy intake between the 1970s and 2000 from the Centers for Disease Control and Prevention are 168 and 335 kcal/d for men and women, respectively, and from data published by the CSFII (Continuing Survey of Food Intake of Individuals) they are 268 and 143 kcal/d for men and women, respectively (8). These estimates of increased energy intake are more than sufficient to provide the basis for the population-wide weight gains over the past 40 y. Swinburn et al (9) estimated energy flux by using doubly labeled water and suggested that the energy gap and thus the energy intake needed to provide for it is ≈400 kcal/d.

Because our caloric intake is distributed between meals and snacks, the question then becomes which of these categories has shown the greatest change and which one might be most susceptible to modification by behavioral strategies?

In an economic analysis of food consumption patterns, Cutler et al (10) reported that snack intake showed the largest increase of any of these food categories. Snacks consist of beverages, often soft drinks, and solid foods. These soft drinks can provide a major component of our caloric intake. Duffey and Popkin (11) estimated that ≥20% of total daily calories are provided by soft drinks in some segments of the population, and some reports suggest that consumption of soft drinks may be associated with the current epidemic (12, 13).

The study reported by Temple et al (1) asks whether the reduction in snack intake observed when normal-weight individuals are provided with the same snack daily for many days also applies to obese individuals. If this were true, this strategy might provide an important way of helping change eating behavior over an extended period of time.

To put their findings into context, it is helpful to briefly review some factors that control food intake. The quantity of food we eat and the types of food we choose to eat depend on both biological and social signals. We often start eating when, for example, there is a small dip in blood glucose, when there are “hunger” contractions in our stomach, or possibly a change in ghrelin concentrations. We also begin eating at timed intervals during the day that correspond to socially set events such as breakfast, lunch, dinner, and snack times.

The quality of the food we eat during a day depends, too, on where we eat. For example, when food is eaten at a fast-food restaurant (14, 15), more soft drinks and more high-fat foods are consumed than on a day when the individual does not eat at a fast-food restaurant. When food was eaten at a fast-food restaurant, compared with the control day, energy intake increased from 1816 to 1971 kcal/d and less cereal, milk, and green and yellow vegetables and more fried potatoes and soft drinks were consumed (14).

The idea of reducing the “wanting” and “liking” of food that Temple et al (1) set out to test was a provocative one that might have increased the usefulness of providing boring or monotonous snacks in behavioral treatment of obesity. In contrast to their hypothesis, the obese group increased their consumption of a test meal after the provision of the same snack food for 14 d, whereas the control group who were, on average, overweight [body mass index (BMI; kg/m²): 27] responded in the opposite direction: that is, they ate less of a test meal after the repeated intake of the snack foods. Instead of inhibiting the intake of food in the test situation as was observed in the control subjects, the obese subjects actually ate more when they were given the same snack over the test period of 14 d. This experiment shows that the liking and wanting of foods can be separated. But overall, these results are disappointing because implementing this strategy might enhance food intake in obese people. This study shows...
that we still have some way to go before we understand how preferences for food can be effectively modified to provide support for behavioral change in eating behavior. In retrospect, the authors’ findings might have been anticipated from their studies on habituation to the same food stimulus, which suppresses food intake more in control than in obese subjects (16).

Rather than use food as a strategy, another group studied the effect of promoting water intake by using cluster randomization in 32 elementary schools in 2 German cities. The risk of overweight was reduced 31% in the schools with the enhanced water intake. The BMI SD scores for the children did not change, however, which meant that the effect was primarily on the overweight children (17). Thus, a focus on “noncaloric” strategies may be a more useful strategy for future studies than the use of food.

The author had no conflict of interest.

REFERENCES


