Two more pieces to the 1000-piece carbohydrate puzzle

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The primary role of carbohydrate is to provide energy to all cells in the body. The conclusions of the 2010 Dietary Guidelines Advisory Committee carbohydrate chapter are summarized below (1):

- Healthy diets are high in carbohydrate. The Acceptable Macronutrient Distribution Range for carbohydrates is 45–65%. A maximum intake of 25% of added sugars is suggested.
- Americans should choose fiber-rich foods such as whole grains, vegetables, fruit, and cooked dry beans and peas as staples in the diet. Dairy products are also a nutrient-dense source of carbohydrates.
- Carbohydrates are the primary energy source for active people. Sedentary people, including most Americans, should decrease consumption of caloric carbohydrates to balance energy needs and attain and maintain ideal weight.

The movement to a higher carbohydrate diet in the United States is linked to publication of the Dietary Goals for the United States (also known as the McGovern report) (2), which included the following 3 recommendations:

1) Increase carbohydrate intake to account for 55–60% of energy intake
2) Reduce fat consumption to 30% of energy intake
3) Reduce sugar consumption by 40%

In 1977, fat accounted for ~42% of total caloric intake, so the Dietary Goals recommendation supported substituting fat with carbohydrate. These recommendations were based on epidemiologic findings that higher intakes of fats, especially saturated fats, were linked to higher rates of ischemic heart disease (IHD). Examples of low-fat, high-carbohydrate, and low-sugar diets are not given in the document, and dietitians would wonder how you were supposed to increase carbohydrates while reducing sugars so drastically.

The Dietary Guidelines for Americans (3) were first published in 1980 in response to the Dietary Goals and have been published every 5 y since that time. The dietary advice has remained remarkably unchanged, with higher carbohydrate diets recommended over higher fat diets to reduce the risk of IHD.

Harper (4) published many articles that questioned the wisdom of recommending high-carbohydrate diets for all. Breast milk derives >50% of its calories from fat so that infants consume high-fat diets. Children who consume low-fat diets experience “failure to thrive” (4). Overzealous parents who want to prevent heart disease in their children assume that low-fat diets are appropriate across the life cycle. Such well-intentioned dietary restrictions may do more harm than good.

In this issue of the Journal, Rebello et al (5) report that total carbohydrate intake is not linked to IHD mortality. They conducted a prospective cohort study in a Chinese population. Dietary information was collected by a food-frequency instrument with investigator decisions—excluding the consumption of potatoes and preserved vegetables from total vegetable consumption—adding to the confusion of studies of fruit and vegetables and health outcomes (6). Efforts to examine the effect of whole grains and desserts on mortality were generally not successful, perhaps because of low intakes of these items in their population. Dietary fiber intake was found to be protective against IHD in this study.

In contrast, Kell et al (7) found that added sugars in the diet were positively associated with diastolic blood pressure and triglycerides in children. Strengths of this study are that it was in a diverse group of children and dietary data were collected by 24-h recalls. Weaknesses include the design (cross-sectional) and small sample size (n = 320). The authors conclude that increased consumption of added sugars may be associated with adverse cardiovascular health variables in children. According to the trial registry (clinicaltrials.gov), this study was designed to determine the role of genetic markers on insulin response, not whether intake of added sugars is linked to cardiovascular biomarkers.

To learn about nutrition we always have to look at the body of evidence. It would be great if we had randomized controlled trials (RCTs) for every nutrition question (8). But not all diet and health outcome relations can be practically or ethically evaluated by RCTs. Therefore, many dietary recommendations are supported by evidence primarily from observational data, particularly from prospective cohort studies. Although such evidence is of critical importance, the limitations must be appreciated by nutrition scientists and policy makers. Cross-sectional studies are low on the hierarchy of evidence scale and are given less weight than RCTs or prospective cohort studies.

Added sugars have become the nutrition villain du jour with proposed guidelines to list added sugars on the Nutrition Facts

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panel and bans on chocolate milk in schools. As a card-carrying dietitian in good standing, I certainly am not going to tell people to eat more sugar. But we must be clear that added sugars provide 4 kcal/g just like any other digestible carbohydrate and are no more likely to cause weight gain than any other calorie source (1). The rationale to reduce intake of added sugars in the Dietary Guidelines for Americans is to reduce calories and thereby increase nutrient density. Added sugars are not the new trans fats. They are not the ”smoking gun.”

People do not eat added sugars; they eat foods that provide nutrients, and dietary guidance to drive out added sugars will have unintended consequences of actually deterring from public health. Banning chocolate milk in school cafeterias leads students to take less milk overall, drink less (waste more) of the white milk they do take, and no longer purchase school lunch (9). Milk contains important nutrients of concern in the US population, particularly calcium, potassium, and vitamin D. The 8 g of high-quality protein provided in each serving of milk will only be delivered if the milk is consumed.

Nutritional nit-picking has been unsuccessful in improving public health. Nutrient-based interventions are generally ineffective, as are bans on sugar-sweetened beverages (10). Dietary pattern recommendations are more likely to show success in improving cardiovascular health (11).

Although the 2 studies published in the current issue of the Journal provide 2 more pieces to the carbohydrate puzzle, my carbohydrate puzzle is starting to look more like foods, not grams of added sugar. I see a wide range of popular carbohydrate foods: French bread, Italian pasta, Chinese rice, Indian dal, Greek yogurt, Irish potatoes, African plantains, Mexican corn tortillas, and even American hamburger buns taking shape on the carbohydrate puzzle plate.

I would like to echo the words of the Food and Nutrition Board in their publication Toward Healthful Diets (12): “The Board expresses its concern over excessive hopes and fears in many current attitudes toward food and nutrition. Sound nutrition is not a panacea. Good food that provides appropriate proportions of nutrients should not be regarded as a poison, a medicine, or a talisman. It should be eaten and enjoyed.”

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REFERENCES