Fruit juices

Considering the fruit and fruit juices typically consumed by Americans (2), the 2005 US Dietary Guidelines Advisory Committee recommended that no more than one-third of the total recommended fruit group intakes come from fruit juice with the rest coming from whole fruit to meet the requirements for vitamin C, folate, and potassium. In the context of food-based guidance, the US Department of Agriculture Food Guide recommends 4 servings per day from the Fruit Group for a person on a 2000-calorie diet. One-third of this is \( \approx 1 \) serving juice/d. This is somewhat similar to the upper end of what Popkin et al (1) proposed (0–8 fl oz fruit juice/d).

An essential difference between the recommendations of the US Dietary Guidelines 2005 (2) and the Popkin et al report (1) is that the Dietary Guidelines Committee supported the DRI report (4) that indicated that under most circumstances one does not have to choose water or other specific fluids to remain hydrated. Rather, the process is automatic as long as water is available. However, it is clear that the US Dietary Guidelines 2005 report (2) recommends a food-based approach and that individuals should choose foods and beverages that contain certain nutrients. It is our opinion that a graphic suggesting that tea and coffee are superior nutritional choices to skim milk is inappropriate. Despite this, the Popkin et al (1) article has raised an important issue that merits further scientific discussion. Such a dialogue is essential for the evolution of future dietary recommendations. As scientists involved in efforts to promote the health and well-being of Americans, we have a responsibility to take a robust, evidence-based approach to decrease the obesity epidemic. Therefore, we encourage the 2010 Dietary Guidelines Committee to perform an evidence-based review of the health effects of tea and coffee and to continue to monitor hydration, particularly as it relates to thirst in different age groups. We also are mindful of the need for additional research to determine the role of calorically sweetened beverages on weight control. Intertwined in this discussion is the reality that noncaloric beverages are an important part of the social fabric in our society, and we believe that some guidance should be provided in the future that addresses this issue.

All authors were members of the 2005 Dietary Guidelines Advisory Committee.

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REFERENCES

Response to C Weaver et al

Dear Sir:

We want to thank Weaver et al for their letter, which provides us with a chance to clarify a few issues that they raised. Our article (1) identified the conceptual and practical issues surrounding the role of...
beverages in the US diet. Except for alcohol, the 2005 Dietary Guidelines Committee did not discuss in detail the health effects of different beverages, concentrating instead on their nutrient content. Thus, we regard our effort as complementary to that of the Dietary Guidelines Committee. Unlike the broad goals of the Dietary Guidelines Committee and the Institute of Medicine (IOM) Dietary Reference Intakes committees, our beverage guidance panel’s effort is focused on the overall role of beverages in the diet. We are concerned that \( \geq 21 \% \) of calories in the American diet are derived from beverages, and we believe that this is an important factor in excessive energy intake and the obesity epidemic. Both the Dietary Guidelines Committee and our panel agree that obesity is one of the major public health problems in the United States, and both emphasize the need to control caloric intake. The 2005 Dietary Guidelines aimed to insure “adequate nutrient intake within caloric needs.” We believe that reducing the consumption of caloric beverages is a key step in controlling energy intake, because caloric beverages represent almost 50% of the increase in caloric intake over the past 10 y. Because evidence suggests that energy consumed in fluid form is, at best, only weakly related to satiety and elicit only a small compensatory response, it is important to provide more specific guidance to the public regarding beverage intake to reduce total energy intake. This point has not been addressed in detail in the Dietary Guidelines Committee report and is not mentioned in Weaver’s letter. The 3 key issues raised in the letter are addressed below. Guidance about beverage intake should consider both water and energy needs and ways to balance the critical tradeoffs between nutrients and calories contained in beverages and foods.

**Water**

Although recognizing that fluid needs vary greatly from day to day among individuals, the IOM Panel on Water and Electrolytes defined an adequate intake (AI) for water of 3.7 L/d for men and 2.7 L/d for women (2). Although the AI is not an indicator of actual requirement, it is used to provide guidance regarding recommended intakes. The IOM Dietary Reference Intakes reports presented important nutrient requirements, including calcium, in terms of AI instead of the Estimated Average Requirement. And although it is true that thirst can regulate hydration in healthy people, this relation becomes complex when fluids contain energy (calories), caffeine, or a sweet taste. The IOM Water and Electrolytes report suggests that “automatic” fluid intake can increase significantly when sweetener or flavor is added to plain water. Thus, considering the problem of obesity and the dramatic increase in caloric beverage use, we believe that US citizens need guidance regarding the amount and type of beverages to consume. And, contrary to the assertion by Weaver et al that our advice regarding water consumption has no scientific basis, our advice is entirely based on data from the IOM Water and Electrolytes report. The data we used in Figure 2 is based on data presented in Table 4.14 of the IOM Water and Electrolytes report, which presents a menu plan that fulfills all nutrient needs and the AI for water for an adult who consumes 2200 kcal/d (2). Our example does not recommend 20–50 fl oz of water, but states that water may range from 100% of fluid needs to 20–50 fl oz when other beverages are consumed.

The IOM report did not measure or examine the issues of adequacy of water intake or the distribution of water consumption in the United States. The IOM report examined data regarding median water intake and noted that this median level was adequate. Because limited studies have focused on hydration and toxicity in large populations, and because minimal agreement exists regarding how to measure hydration status, the IOM explicitly did not discuss these matters. More data on hydration levels are needed, particularly in the elderly (3, 4).

**Tea and coffee**

The 2005 Dietary Guidelines Committee did not address the health effects of tea and coffee consumption. Research on the health effects of tea and coffee is still evolving, and more evidence is needed to make categorical recommendations. We feel our measured conclusions reflect this. We stated that “the current data suggest that consumption of \( \geq 3 \) cups of black tea/d may modestly decrease the risk of myocardial infarction” and “recent evidence suggests that tea consumption improves endothelium-dependent vasodilation.” We also concluded that “despite these intriguing results, the potential health benefits of flavonoids in tea ... remain to be fully explored.” We additionally discussed several prospective cohort studies that showed “significant inverse associations between regular coffee consumption and the risk of type 2 diabetes.” On the other hand, we found no evidence of adverse effects of tea or coffee consumption within the limits of moderate daily caffeine intake, and thus we recommended consumption of unsweetened coffee or tea, next to water. Note that the suggested intake range for tea and coffee begins at zero, indicating that no consumption at all is also acceptable.

**Milk**

The contribution of milk to the intake of several essential nutrients in the United States is well recognized, as acknowledged in our article. But we would like to point out that neither the 2005 Dietary Guidelines Committee nor the Water and Electrolytes Panel consider milk indispensable. The 2005 Dietary Guidelines accept the possibility of a milk-free diet, stating “those who avoid all milk products need to choose rich sources of the nutrients provided by milk,” and refer the reader to an appendix where such alternative sources are listed. The Water and Electrolytes Panel, after mentioning the multiple sources of fluids in the human diet (including milk), states that “while all these can contribute to meeting the Adequate Intake [for water], no one source is essential for normal physiologic function or health.” The current US reliance on milk products to fulfill human needs for several key nutrients is not the result of a biological imperative, but rather the result of behavioral, cultural, and economical factors. Weaver considers the fulfillment of potassium needs from a diet without milk “particularly problematic.” But the contribution of milk to potassium intake has more to do with the poor intake of other potassium-rich foods than to the inherent properties of milk. For example, although 1 cup of milk provides 382 mg potassium, one-half cup of cooked beet greens provides 655 mg, the same amount of spinach yields 419 mg, and white beans 595 mg (all figures taken from the 2005 Dietary Guidelines Committee report). In many cases, consuming the same amount of potassium from these sources results in a lower caloric intake than if consumed from nonfat milk. In addition, some studies have suggested possible adverse effects of long-term milk consumption in the adult population, such as the risk of prostate cancer. The role of milk on adults’ diet should continue to be studied in an unbiased and rigorous manner.

Finally, we wish to stress that our contribution sought to highlight the key role that beverages play in the relation between the current US diet and health. Future Dietary Guidelines committees should consider the implications of using liquid energy and
nutrient sources to fulfill dietary requirements. There are important differences in the human physiologic response to solid and fluid calories. First, evidence suggests that fluid calories are not as easily “recognized” by systems regulating energy balance as are solid calories, and thus they are more likely to result in overconsumption. Second, day-to-day fluid needs vary widely in a person, whereas nutrient requirements are relatively stable on a day-to-day basis. Thus, an optimal diet should fulfill the relatively stable daily nutrient and energy needs while allowing for variations in fluid consumption. This can be best achieved by providing much of the nutrient needs from solid foods and fulfilling fluid needs with water or other noncaloric fluids. Of course, variety and taste are very important, and it is advantageous to allow for a variety of noncaloric fluids in addition to water.

A primary purpose of our panel was to highlight the potential role of calories from beverages in the current epidemic of obesity and the difficulty of compensating for these calories by reducing energy from solid foods when energy from beverages increases. These are important issues for the Dietary Guidelines Committee to consider when the next version of the Dietary Guidelines is prepared, and we welcome this dialogue with the nutrition community to help develop this focus. We hope that this exchange of ideas will contribute to the clarification of these important issues.

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REFERENCES


Beverage guidance system is not evidence-based

Dear Sir:

A “beverage guidance system” for the United States was recently proposed that ranks beverages based on caloric and nutrient content and an assessment of health benefits and risks (1). Water was ranked as the preferred beverage, followed, in order, by tea and coffee, low-fat and skim milk and soy beverages, noncalorically sweetened beverages, beverages with “some nutritional benefits” (juices, whole milk, alcohol, and sports drinks), and calorically sweetened, nutrient-poor beverages. Unfortunately, the usefulness of the ranking is questionable because it is based on selective evidence.

Ranking beverages from the lowest to highest “value” is based on the unfounded belief that beverages are inherently more or less healthy regardless of their context within an overall diet. This approach is analogous to ranking foods such as cheese, strawberries and chicken from healthiest to least healthy. Ranking these foods is nonsensical because each provides a range of nutrients that can contribute to a healthy diet, and their importance to overall eating is dependent on individual requirements and the content of the rest of the diet. The approach is not consistent with the fact that overall patterns of eating over time, rather than individual foods or beverages, determine whether a diet is relatively healthy or unhealthy.

The major factor used to rank beverages was caloric content, with higher-calorie beverages generally ranked lower than lower-calorie beverages, with the intention that this would help reduce energy intake and obesity. Data in support of this hypothesis was presented; however, evidence suggesting that this may not be the case or that data are equivocal was ignored.

The authors suggest that higher-calorie beverages, particular calorically sweetened soft drinks, contribute directly to obesity because intakes have increased concurrently with obesity rates and calories from liquids are less satiating than are those from solids; however, other evidence suggests the putative relation between soft drinks and obesity may be unfounded. The authors noted that soft drink intake increased between 1977 and 1996 concurrently with obesity rates; however, they failed to point out that there has actually been no increase in per capita consumption (disappearance) of sweetened soft drinks over the past decade (1995–2004) (2), a time