

# Sugar-Sweetened Beverages: An Emerging Target for Cardiometabolic Risk Modification

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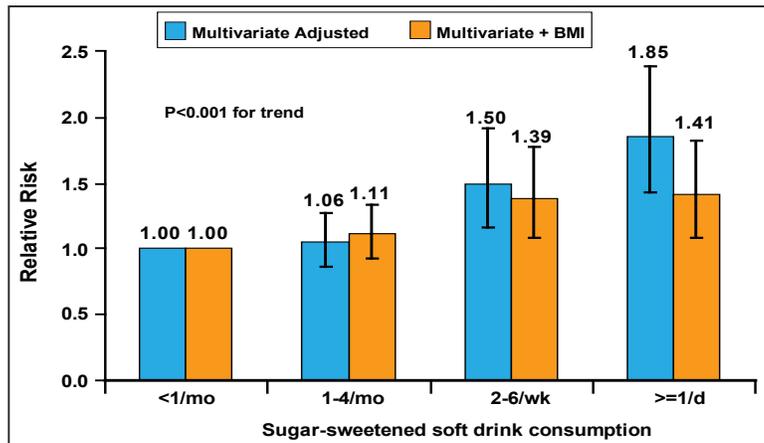
The consumption of sugar-sweetened beverages (SSBs), such as sodas, fruit drinks, sports drinks, and energy drinks, has increased considerably over the past decade, in parallel with the rising prevalence of obesity. In this session, presenters discussed the adverse cardiometabolic effects of SSB consumption and the role of healthy drinking in cardiovascular (CV) risk reduction.

## SSBs and Cardiometabolic Risk

Worldwide, SSBs are a major source of excess calories and glycemic load in the diet. Frank B. Hu, MD, PhD, Harvard School of Public Health, Boston, Massachusetts, USA, described the adverse effects of excess SSB consumption on cardiovascular health.

In the Nurses' Health Study II, women who consumed 1 or more sugar-sweetened soft drinks per day were significantly more likely to develop type 2 diabetes (T2DM) than those who consumed less than 1 beverage per month, even after controlling for body mass index (BMI;  $p < 0.001$ ; Figure 1) [Schulze. *JAMA* 2004]. In a meta-analysis of 310,819 patients, those in the highest quartile of SSB consumption (1-2 servings per day) had a 26% greater risk of developing T2DM than those in the lowest quartile of SSB intake, who averaged <1 serving per month (RR, 1.26; 95% CI, 1.12 to 1.41). Regular SSB drinkers also had a 20% increased risk of metabolic syndrome compared with light SSB drinkers (RR, 1.20; 95% CI, 1.02 to 1.42) [Malik VS et al. *Diabetes Care* 2010].

**Figure 1. Relative Risk of T2DM According to Sugar-Sweetened Soft Drink Consumption.**



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Reducing SSB consumption offers a relatively simple, low-cost option for improving cardiometabolic risk profile. In a study of 810 adults with hypertension, drinking 1 less SSB per day led to a reduction of 1.8 mm Hg and 1.1 mm Hg in systolic and diastolic blood pressure, respectively, after 18 months. The beneficial effects on blood pressure were independent of any effects on body weight [Chen L et al. *Circulation* 2010].

Although there is no convincing evidence of harm that is associated with diet soda, it may not be the best replacement for regular soda and other SSBs, Dr. Hu said. Plain water and unsweetened coffee and tea are better alternatives for individuals who are trying to reduce their consumption of SSBs.

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### *Metabolic Effects of Excess Fructose Intake*

The worldwide epidemic of obesity stems largely from increased caloric intake as well as reduced physical activity. In the United States and other Western countries, half or more of the caloric intake in beverages is consumed in the form of fructose. George A. Bray, MD, Pennington Biomedical Research Center, Baton Rouge, Louisiana, USA, described the detrimental metabolic changes that are associated with increased fructose intake.

Fructose is more biologically active than glucose. Compared with glucose, fructose stimulates a greater degree of oxygen consumption and thermogenesis per gram, although it has a smaller effect on insulin secretion. Fructose is also associated with a greater increase in postprandial triglyceride levels compared with glucose [Teff KL et al. *J Clin Endocrinol Metab* 2009]. This association with triglyceride levels is disconcerting, Dr. Bray said, given that elevated triglyceride levels are known predictors for cardiovascular disease (CVD).

Excess fructose intake may be particularly detrimental for overweight and obese individuals. In a study of 32 overweight and obese patients, the consumption of fructose-sweetened beverages specifically promoted dyslipidemia, decreased insulin sensitivity, and increased visceral adiposity [Stanhope KL et al. *J Clin Invest* 2009]. By comparison, the consumption of glucose-sweetened beverages did not increase the accumulation of visceral fat. Fructose consumption has also been shown to increase blood pressure levels; increase systemic inflammatory markers, such as C-reactive protein; and increase uric acid production in the liver.

“In my judgment, fructose in the amounts now consumed is hazardous to the health of some people,” Dr. Bray said. Reduced consumption of fructose-sweetened beverages is an important goal for CV risk reduction.

### *Healthy Drinking As a Therapeutic Lifestyle Modification*

Occasional or moderate consumption of caloric beverages, including SSBs, milk, and alcohol, can be part of a healthy diet. However, excess or habitual consumption of caloric beverages can have detrimental metabolic effects. Barry M. Popkin, MD, University of North Carolina, Chapel Hill, North Carolina, USA, described the role of healthy drinking as an important therapeutic lifestyle modification for persons at risk for obesity, diabetes, and CVD.

For most people, beverage consumption does not influence food intake. When individuals drink less water in favor of caloric beverages, there is no compensation in terms of

reduced food intake. Therefore, the sharp increase in SSB consumption in recent decades has contributed to the global obesity epidemic.

Health care providers should suggest that patients increase their water intake and reduce their SSB consumption as part of a strategy to prevent excess weight gain, Prof. Popkin said. Several epidemiological studies suggest that replacing SSBs with water has the potential to reduce total caloric intake by 200 calories or more per day. In one study, replacing vending machines that offered SSBs with filtered-water fountains reduced the risk of obesity by 31% [Muckelbauer R, L Libuda et al. *Pediatrics* 2009]. More studies are needed to demonstrate the effects of replacing SSBs with water on cardiometabolic outcomes and CVD risk, Prof. Popkin said.

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