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Invited Commentary

New Unsweetened Truths About Sugar

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We are in the midst of a paradigm shift in research on the health effects of sugar, one fueled by extremely high rates of added sugar overconsumption in the American public. By “added



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sugar overconsumption,” we refer to a total daily consumption of sugars added to products during manufacturing (ie, not naturally occurring sugars, as in fresh fruit) in excess of dietary limits recommended by expert panels. Past concerns revolved around obesity and dental caries as the main health hazards. Overconsumption of added sugars has long been associated with an increased risk of cardiovascular disease (CVD).¹ However, under the old paradigm, it was assumed to be a marker for unhealthy diet or obesity.² The new paradigm views sugar overconsumption as an independent risk factor in CVD as well as many other chronic diseases, including diabetes mellitus, liver cirrhosis, and dementia—all linked to metabolic perturbations involving dyslipidemia, hypertension, and insulin resistance.³ The new paradigm hypothesizes that sugar has adverse health effects above any purported role as “empty calories” promoting obesity. Too much sugar does not just make us fat; it can also make us sick.

Despite our changing scientific understanding and a growing body of evidence on sugar overconsumption as an independent risk factor in chronic disease, sugar regulation remains an uphill political battle in the United States.⁴ This is contrasted by the increased frequency of regulation abroad, where 15 countries now have sugar-sweetened beverage (SSB) taxation regimens. A growing body of rigorous studies, to which the study by Yang and colleagues⁵ adds, holds potential to turn the political tide by demonstrating that added sugar is not as benign as once presumed.

Yang and colleagues' analysis falls squarely within the new paradigm. Their study is comprehensive in its use of national trends data on added sugar consumption from 1988 to 2010 combined with a 14.6-year prospective analysis of CVD mortality. The authors are commended for their careful use of statistical controls, affording inferences about sugar's health risks independent of other lifestyle factors (eg, smoking and alcohol consumption), CVD risks (eg, dyslipidemia and hypertension), total calories, and obesity. Although the findings are clear from an epidemiologic perspective, it is important to think through what they mean for consumers, the medical community, and public policy. Here, I see several key implications flowing from this research.

The analysis by Yang et al first speaks to the current debate over how much added sugar is safe to consume. In contrast to sodium, *trans* fats, and other dietary additives used to increase the palatability and shelf life of processed foods, the US government provides no dietary limit for added sugar.⁶ Public health advocates have long called for a national dietary limit and for the removal of sugar from the US Food and Drug Ad-

ministration's “generally regarded as safe” list, which allows manufacturers to add unlimited amounts to any food. In the absence of a federal dietary limit, several nongovernmental expert panels have weighed in. As discussed by Yang et al,⁵ the Institute of Medicine recommends the highest limit: no more than 25% of daily calories should be consumed as added sugar. At the low end, the American Heart Association recommends no more than 25 g/d for women and 38 g/d for men, amounting to 5.0% and 7.5%, respectively, of a 2000-calorie daily diet.

Yang et al inform this debate by showing that the risk of CVD mortality becomes elevated once added sugar intake surpasses 15% of daily calories—equivalent to drinking one 20-ounce Mountain Dew soda in a 2000-calorie daily diet. From there, the risk rises exponentially as a function of increased sugar intake, peaking with a 4-fold increased risk of CVD death for individuals who consume one-third or more of daily calories in added sugar. These findings provide physicians and consumers with actionable guidance. Until federal guidelines are forthcoming, physicians may want to caution patients that, to support cardiovascular health, it is safest to consume less than 15% of their daily calories as added sugar.

This study's findings have further implications for public policies affecting racial/ethnic disparities in nutrition and food environments—inequalities that stem from the targeted marketing toward and saturation of minority communities with processed foods and SSBs. Remedies today focus on “healthy retail initiatives” that incentivize corner stores and school and workplace concessions to restrict the sale and marketing of sugar-laden foods while promoting healthier alternatives. Other policymakers use local zoning ordinances to restrict the number of fast-food outlets and corner stores while subsidizing farmers' markets in minority and low-income communities.

The national survey analysis conducted by Yang et al⁵ documents pronounced disparities in added sugar consumption since the late 1980s. The prevalence of heavy sugar consumption ($\geq 25\%$ of daily calories) is disproportionately high among blacks. From 2005 through 2010, 16.9% of blacks were heavy consumers of sugar compared with 9.1% of whites and 11.9% of Mexican Americans. At its peak from 1999 through 2004, a remarkable 25.9% of blacks heavily consumed added sugar; this percentage was 15.6% among whites and 17.6% among Mexican Americans. It is encouraging that population-wide rates have since declined and that heavy sugar consumption was not significantly associated with CVD mortality among blacks in this analysis, although it was among whites. Still, at the end of the day, this study documents rates of heavy sugar consumption among blacks nearly double those of whites, reaffirming the need for a national strategy to address inequities in food access.

Perhaps the most timely aspects of the analysis by Yang et al⁵ address the link between SSB consumption and CVD mor-

tality. Sugar-sweetened beverages have been a focal point of recent food policy debates, with numerous calls for SSB taxation across US cities and states, alongside a global trend. “Sin taxes,” whether on tobacco, alcohol, or sugar-laden products, are popular because they are easy to enforce and generate revenue, with a well-documented evidence base supporting their effectiveness for lowering consumption at the population level.^{7,8} Detractors often challenge the singular focus on SSBs as discriminatory by excluding other sugary foods and often deny any need for regulation based on the old paradigm’s assumption that excess sugar mainly causes weight gain—an issue of personal willpower and choice that does not call for societal intervention.

The results reported by Yang and colleagues⁵ support the logic for singling out SSBs for taxation. Sugar-sweetened beverages are by far the single largest source of added sugar in the American diet, accounting for 37.1% of all that is consumed nationally. Their prospective analysis further documents that even relatively modest but regular consumption of SSBs—

drinking one 12-ounce soda a day—increases the risk of CVD mortality by almost one-third, independent of total calories and other cofactors. Their study thus underscores the appropriateness of evidence-based sugar regulations, specifically, SSB taxation.

In sum, the study by Yang et al contributes a range of new findings to the growing body of research on sugar as an independent risk factor in chronic disease. It underscores the likelihood that, at levels of consumption common among Americans, added sugar is a significant risk factor for CVD mortality above and beyond its role as empty calories leading to weight gain and obesity. The authors remind us that current policy debates around food are intrinsically debates involving racial/ethnic disparities, with blacks being disproportionately affected. In addition, Yang et al underscore the need for federal guidelines that help consumers set safe limits on their intake as well as evidence-based regulatory strategies that discourage excess sugar consumption at the population level.

ARTICLE INFORMATION

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