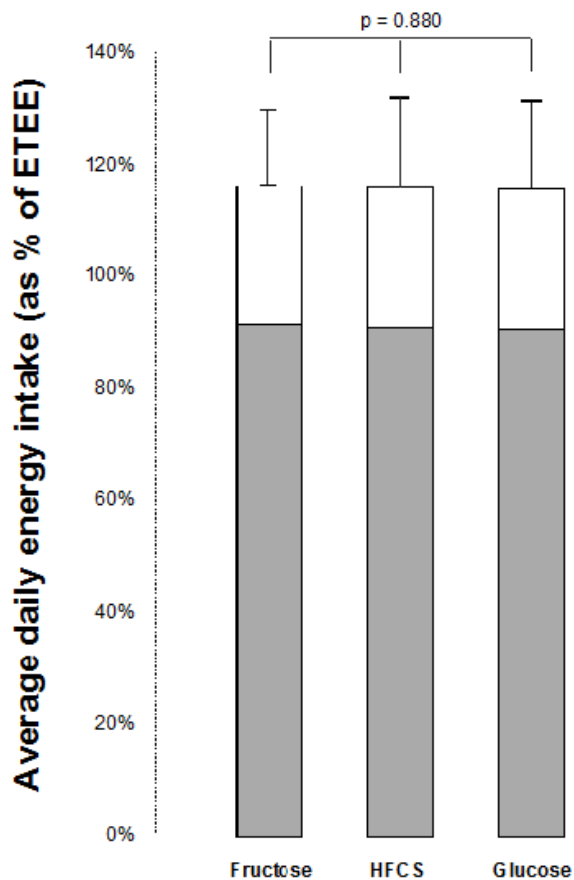


# Incentive to lay low on the holiday punch this season

December 20, 2015

N Zubair



Mean ( $\pm$  SD) daily energy intake from solid foods (grey portion of the bars) and beverages (white portion of the bars), as a percentage of estimated total energy expenditure (ETEE) during each diet period. Total energy intake was consistently 16% above estimated energy expenditure, indicating that participants did not reduce their intake of solid foods enough to fully compensate for the calories taken up as a sugar-sweetened beverage. Total energy intake was not affected by the type of sugar used to sweeten the beverages, however. The p-value is based on an overall repeated measures analysis of variance (RM-ANOVA).

*Image provided by Jessica Kuzma.*

Sugar-sweetened beverages (SSBs) are ubiquitous in the U.S. diet; approximately 7% of energy intake comes from SSBs. On any given day, half the people in the U.S. consume SSBs and 1 in 4 get at least 200 calories from such drinks. A large body of scientific evidence implicates SSB consumption with increased energy intake and obesity. One explanation for this occurrence is that our bodies sense calories coming from liquids, such as SSBs, differently than those coming from solid food. This potentially leads to our inability to fully compensate for liquid calories by decreasing energy intake elsewhere in the diet. Another less established explanation for the link between SSB consumption and increased energy intake implicates the type of sugar used to sweeten these beverages.

Today, most SSBs are sweetened with either sucrose or high-fructose corn syrup (HFCS). Both substances contain the monosaccharides, or single sugar units, fructose and glucose in almost equal proportions: sucrose is 50% fructose and 50% glucose, while HFCS is typically 55% fructose and 45% glucose. Fructose, unlike glucose, is only metabolized in the liver and does not cause insulin to release or stimulate the production of leptin, a key hormone for regulating energy intake and expenditure. This suggests that fructose may be less satiating than glucose and thus contribute to the weight gain effects of SSBs.

To address this hypothesis, Ms. Jessica Kuzma, Dr. Mario Kratz, and colleagues (Public Health Sciences Division) evaluated whether the fructose content of SSBs affects total energy intake. They presented their results recently in *The American Journal of Clinical Nutrition*. The researchers conducted two randomized, controlled, double-blind cross-over studies (Studies A & B) to assess ad libitum energy intake over 8 days in healthy adults. In both studies, the researchers provided SSBs at 25% of an individual's estimated energy requirement. In Study A, an equivalent volume of an aspartame-sweetened beverage, which has approximately zero calories, was also given. The consumption of the beverages was mandatory, while solid food, also supplied by the researchers, was consumed until participants felt comfortably full (ad libitum).

Study A compared the effects of consuming 4 servings per day of a fructose-, glucose-, or aspartame-sweetened beverage in 9 adults. Here adults consumed significantly more calories when given a glucose or fructose-sweetened beverage (SSB) compared to the aspartame-sweetened beverage, with those drinking SSBs consuming about 16% more calories than needed to meet their energy requirements. These results demonstrate that participants only reduced their intake of solid food to compensate for a mere one-third of the calories consumed in the SSB.

Study B compared the effects of consuming 4 servings per day of a fructose-, glucose-, or HFCS-sweetened beverage in 24 adults. The adults consumed excess calories, an amount similar to that of Study A. Interestingly, this excess did not vary across the types of SSBs.

Kuzma, the lead author on the paper, describes the novelty of this study, the impact of consuming beverages sweetened with fructose vs. HFCS vs. glucose on overall ad libitum energy intake had previously not been tested in a well-controlled, cross-over design dietary intervention study in healthy adults. Their findings send a poignant message, as Kuzma states, over time, chronic consumption of beverages sweetened with any sugar would be expected to lead to weight gain. While our study provided a rather high dose of SSB, our results strongly suggest that even much smaller amounts could lead to an overall increase in energy intake. Our results also demonstrate

that fructose is not solely responsible for the overconsumption of calories and weight gain seen in people consuming soda or other beverages containing sugar. Rather, consuming any sugar in liquid form appears to blunt the mechanisms controlling energy intake and homeostasis, leading to an overall increased energy intake. In conclusion, no matter how you sweeten it, liquid calories could easily derail one's New Year's health resolutions.

Additional Fred Hutch investigators contributing to this research were Gail Cromer, Derek K. Hagman, Kara L. Breymeyer, and Sarah E. Holte.

Funding for this study was provided by the National Institutes of Health and the National Cancer Institute.

[Kuzma JN, Cromer G, Hagman DK, Breymeyer KL, Roth CL, Foster-Schubert KE, Holte SE, Callahan HS, Weigle DS, Kratz M.](#) 2015. No difference in ad libitum energy intake in healthy men and women consuming beverages sweetened with fructose, glucose, or high-fructose corn syrup: a randomized trial. *Am J Clin Nutr.* 102(6):1373-1380.