

Consumption of Fructose-, but not Glucose-Sweetened Beverages Produces an Atherogenic Lipid Profile in Overweight/Obese Men and Women

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Abstract from the American Diabetes Association Scientific Sessions:

Authors: Kimber Stanhope et al.

Results:

Consumption of sugar-sweetened beverages containing fructose has increased by 135% from 1977 to 2001 and may be a contributing factor to an increased incidence of metabolic syndrome. Direct experimental evidence that fructose consumption promotes the metabolic syndrome in humans is lacking. We investigated the effects of 10 weeks of fructose compared with glucose consumption on lipid parameters in overweight/obese (BMI: 25–35 kg/m²) adults. Subjects resided in the Clinical and Translational Science Research Center (CCRC) for 2 weeks. Baseline procedures, including a 24-hr blood collection, were conducted while subjects consumed an energy-balanced, moderate fat (30%), high complex carbohydrate (55%) diet. Subjects then began an 8-week outpatient intervention and consumed either fructose- (n=13) or glucose-sweetened (n=10) beverages at 25% of energy requirements with a self-selected ad libitum diet. At 2, 8, & 10 weeks of intervention, additional 24-hr blood collections were performed. At intervention week 9, subjects returned to the CCRC for 2 weeks while consuming the beverages with the energy balanced diet. 24 hr postprandial triglyceride (TG) profiles were increased by 212 ±59% after 2 weeks of fructose consumption (p<0.0001), but tended to decrease (-30 ±23%) in subjects consuming glucose. Fasting plasma concentrations of LDL-C (+17 ±4%), apoB (+28 ±7%), small dense (sd) LDL-C (+27 ±11%), & postprandial concentrations of remnant lipoprotein (RLP)-TG (+77 ±19%) and of RLP-cholesterol (+53 ±12%) were increased (p<0.01) in subjects consuming fructose-sweetened beverages, but were unchanged in those consuming glucose beverages. These changes were maintained after 8 & 10 weeks of fructose consumption. In addition, plasma concentrations of oxidized LDL-C were increased by 15 ±2% (p<0.0001) and intracellular adhesion molecule (ICAM) increased by 8 ±3% (p<0.05) in subjects consuming fructose, but not in those consuming

glucose. Increased postprandial TGs, LDL-C, apoB, sdLDL-C, RLPs, oxidized LDL, and sICAM are considered risk factors for atherosclerotic cardiovascular disease. Thus, consumption of 25% of energy requirements from fructose promotes an atherogenic lipid profile within 2 weeks, whereas consuming 25% of energy from glucose does not. Persons at risk for developing metabolic syndrome and cardiovascular disease should avoid overconsumption of fructose-containing beverages.

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