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One of the major contributing factors to the prevalence of obesity in United States is the Western Diet, characterized by consumption of high fat and high simple sugars. Even though the issue of obesity has become a national interest, few studies have explored the relationship of high sugary diets (HSD) and obesity. The objective of this study was to determine the effects of HSD on weight gain and adipokine expression in adipose tissues.

3T3-L1 cells were cultured and differentiated in recommended differentiation medium supplemented with stock sugar solutions. Lipid accumulation was quantified with Oil Red O assay. Total RNA was isolated, first strand cDNA synthesized, and qRT-PCR performed. C57BL/6 male mice were fed normal rodent chow and water with the following sugar concentrations: fructose (10% solution), glucose (10% solution) and a combined fructose/glucose (55% fructose and 45% glucose for a 10% solution) for 16 weeks. Animal weights were recorded and water solutions were measured and replaced every two days.

The *in vitro* data showed significant increase in lipogenesis for fructose/glucose as compared to the control. Pro-inflammatory adipokine expression of 3T3-L1 cells is significantly increased by two-fold when exposed to fructose/glucose solution. HSD-fed mice exhibited an addictive behavior with a significant increase in fructose/glucose water consumption, and weight gain.

While all HSD-fed mice consumed more water and gained weight over time, the fructose/glucose group substantially consumed more water which resulted in major weight gain. Understanding the deleterious effects of over consumption of HSD is paramount to avoiding obesity-related diseases and disorders.