

Added Sugars Drive Insulin Resistance, Hyperinsulinemia, Hypertension, Type 2 Diabetes and Coronary Heart Disease

by James J. DiNicolantonio, PharmD
& James H. O'Keefe, MD



“The evidence incriminating insulin and carbohydrate in atherogenesis is strong, and that this scheme would link atherosclerosis with diabetes, obesity, hyperlipemia, lack of physical exercise, and, possibly, hypertension.”

– Stout and Vallance–Owen 1969¹

It has been known for over 50 years that abnormal carbohydrate metabolism and elevated insulin levels drive high blood lipids.² This is because insulin increases the endogenous synthesis of fatty acids (lipogenesis).³ Elevated levels of insulin are found in many disease states, such as obesity, type 2 diabetes

(T2D), hypertension, peripheral vascular disease, and coronary artery disease.⁴ In individuals who have normal blood pressure, the higher the insulin level the higher the blood pressure.^{5–7} Elevated insulin drives salt-sensitive blood pressure and precedes hypertension in many instances.⁸ For example, insulin resistant individuals have an impaired excretion of sodium in the urine when put on higher sodium intakes.⁹



James J. DiNicolantonio, PharmD, (left), and James H. O'Keefe, MD, (right), are at Saint Luke's Mid America Heart Institute, Kansas City, Missouri.

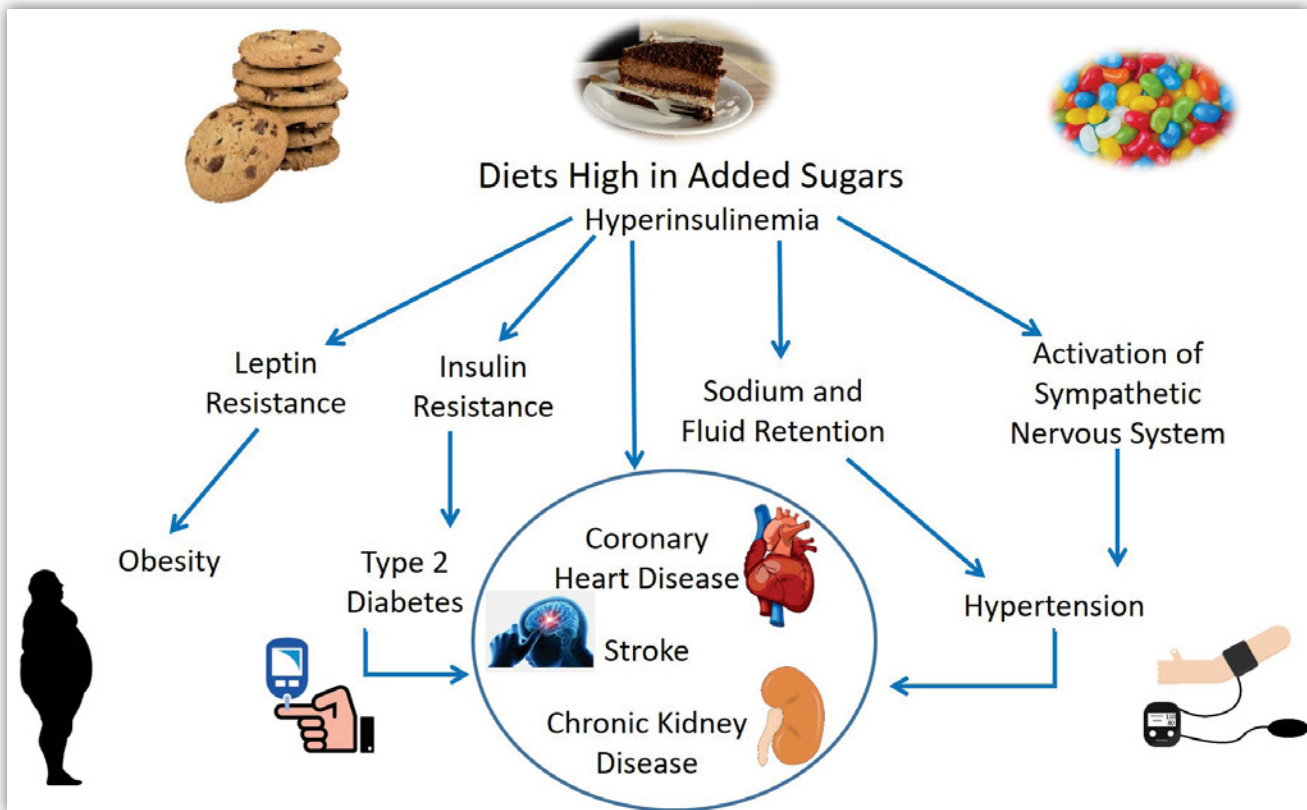


Figure 1. Approximately 13% of the U.S. population consumes at least 25% of their total caloric intake as added sugars.⁶⁸

Elevated insulin results in sodium and fluid retention.^{10, 11} Hyperinsulinemia also enhances sympathetic activity and increases plasma noradrenaline levels.^{12–16} This enhanced sympathetic activity also stimulates the renin-angiotensin system,^{13, 17, 18} thereby promoting further sodium retention.

Salt-sensitive hypertensive patients are more insulin resistant.¹⁹ Several studies have shown that people with normal blood pressure or high blood pressure who are salt-sensitive are hyperinsulinemic, insulin resistant or both compared to those who are salt-resistant.^{8, 20–28} A large portion of salt-sensitive hypertensives are insulin resistant.^{25, 29} However, individuals who are insulin resistant still retain their sensitivity to insulin's ability to promote urinary salt and fluid retention.³⁰ Thus, hyperinsulinemia drives sodium and fluid retention.^{10, 11, 14, 30–34} Improvements in insulin sensitivity via weight loss and exercise decrease salt sensitivity.³⁵ Whatever dietary

substance causes hyperinsulinemia leads to sodium and fluid retention and elevated blood pressure. It turns out that the chief dietary culprit driving hypertension may not be salt, but the other white crystal, sugar.^{16, 36–41} Lowering the intake of refined sugars may be an effective strategy for reducing the incidence of hypertension.

Added Sugars Drive T2D and Coronary Heart Disease

The isocaloric replacement of starch, glucose, or a combination of both, with added sugars (sucrose or fructose), increases fasting insulin levels,^{42, 43} reduces insulin sensitivity,^{36, 38, 44} increases fasting glucose levels,⁴⁵ increases glucose and insulin responses to a sucrose load,^{42, 43} and reduces cellular insulin binding.³⁶ In other words, calorie for calorie, consuming added sugar is more harmful than starch or glucose in regards to worsening hyperinsulinemia, insulin sensitivity

and glucose tolerance all of which are risk factors for cardiovascular disease.^{46–49}

Individuals who consume 10–24.9% of their calories from added sugars, have a 30% higher risk of mortality from cardiovascular disease compared to those who consume less than 10% of their calories from added sugars.⁵⁰ A systematic review of 12 studies encompassing over 400,000 people found that the consumption of sugar-sweetened beverages was significantly associated with higher blood pressure and an increased incidence of hypertension.⁵¹ Globally, sugar-sweetened beverage consumption is implicated in causing approximately 180,000 deaths per year.⁵²

A diet high in added sugars also increases the prevalence of T2D; in contrast, when sugar intake is restricted the risk of T2D is reduced.^{53–55} In humans, when added sugar is restricted to < 5% of total caloric intake there is an approximate 50% reduction in the prevalence of prediabetes/T2D.⁵³ Overconsuming sugar leads to fat cells that are less sensitive to the effects of insulin, which drives visceral adiposity.^{56, 57} Consuming a diet high in added sugars for just a few weeks increases triglycerides, uric acid, lowers high-density lipoprotein cholesterol, and alters platelet function,^{58–61} abnormalities that are found in patients with coronary heart disease or with risk factors for coronary heart disease.^{62–65} Conversely, lowering the amount of added sugar in the diet will improve all of these cardiovascular risk factors.^{42, 61} This suggests that overconsuming added sugars is a major contributor to hypertension, T2D and heart disease. Figure 1 shows the sequence of events for how the overconsumption of added sugars leads to hyperinsulinemia, hypertension, T2D, and heart disease. Figure 1 also depicts how a diet high in added sugars drives hypertension, T2D and heart disease.

Over the past 200 years, the average intake of added sugars went from 4 to 120 pounds per person per year.⁶⁶ In the United States, around 75% of all packaged food items or beverages contains added sugar.⁶⁷ Approximately 13% of the U.S. population consumes at least 25% of their total caloric intake as added sugars⁶⁸ (Figure 1). These current levels

of sugar intake are fueling an epidemic of T2D, obesity, and coronary heart disease. Limiting the consumption of foods and beverages that contain added sugar would be a simple and effective strategy for improving the health of the population. One strategy that has already been implemented in the United Kingdom is a tax on sugar-sweetened beverages that contain high levels of added sugar, which has been shown to be effective among people in poorer socioeconomic circumstances.⁶⁹

When it comes to health, there is nothing sweet about added sugar. Added sugars are used in approximately 75% of packaged foods in the United States.⁶⁷ The average American consumes a quarter to a half pound of sugar per day.^{66, 70} What was once a sweet treat in the form of an apple, or a bit of wild honey, now takes a white crystalline form, and it has become a dietary staple that's hurting the health of the population.

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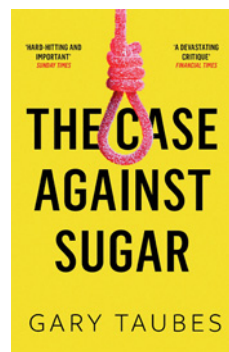
Disclosure

JHO is an owner of a nutraceutical company. **MM**



The Case Against Sugar

by Gary Taubes



Among Americans, diabetes is more prevalent today than ever; obesity is at epidemic proportions; nearly 10% of children are thought to have nonalcoholic fatty liver disease. And sugar is at the root of these, and other, critical society-wide, health-related problems. The author delves into Americans' history with sugar: its uses as a preservative, as an additive in cigarettes, the contemporary overuse of high-fructose corn syrup. He explains what research has shown about our addiction to sweets. He clarifies the arguments against sugar, corrects misconceptions about the relationship between sugar and weight loss; and provides the perspective necessary to make informed decisions about sugar as individuals and as a society.

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SCAN TO READ:

50 Years Ago, Sugar Industry



Quietly Paid Scientists to Point Blame at Fat

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