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THE SKINNY ON SUGAR SUBSTITUTES

Your Weekly Newsletter

by Dr. Nick Sieveking

March 23, 2026

The Sugar Crisis:

- Diabetes
- 38–40 million Americans (all ages) have diabetes (about 11–12% of the U.S. population)
- About 1 in 10 Americans currently lives with diabetes
- Roughly 8–11 million people with diabetes are undiagnosed
- About 90–95% of cases are Type 2 diabetes
- Large prospective cohort studies have shown that diets with a high glycemic index (GI) or glycemic load increase diabetes risk by roughly 20–40% compared with lower-GI diets

Pre-diabetes

- a.k.a. “Insulin Resistance” or “IR”
- The major influence in the top 2 (#1 & #2) leading causes of death on earth
    1. Coronary Artery Disease
    2. Stroke
- Continuous elevation of insulin & glucose levels leads to:
    - Accelerated atherosclerosis
    - Increased arterial stiffness
    - Higher blood pressure
    - Increased risk of heart attack and stroke
    - Visceral fat accumulation
    - Metabolic syndrome
    - Progressive weight gain
    - Nerve damage => diabetic neuropathy => foot ulcers => amputation
    - Blindness
    - Cognitive decline
    - Alzheimer’s disease
    - Cancer risk
    - Hormone disruption
    - Fatty liver disease
    - Accelerated aging

What is the main culprit of this metabolic disease progression from insulin resistance diabetes?

Answer: Frequent consumption of rapidly absorbed carbohydrates, especially refined sugars and high–glycemic carbohydrates, combined with constant eating of ultra-processed foods.

Problem Foods

1. Common Examples of Foods with Refined Sugars
   - Candy and chocolate bars
   - Donuts and pastries
   - Sugary breakfast cereals
   - Fruit juices and sweetened teas
   - Soda and sweetened beverages (energy drinks**)

2. Common Examples of Refined Grains
   - White bread
   - White rice
   - Pasta
   - Pancakes and waffles
   - Crackers and chips

3. Common Examples of Ultra-Processed Snack Foods
   - Potato chips
   - Cheese crackers
   - Snack cakes
   - Packaged pastries
   - Pretzels

4.Common Examples of Sugar-Sweetened “Health” Foods
   - Sweetened yogurt
   - Granola and granola bar
   - Smoothies with added sugars
   - Açai bowls
   - Energy bars

5.Common Examples of High-Glycemic Starches

- Potatoes
- French fries
- Corn products
- Instant oatmeal

Glycemic Index:
A measurement from **0 to 100** that indicates how rapidly a food increases blood sugar compared with pure glucose. This directly correlates with Insulin elevations after eating.

Pure glucose is assigned a value of **100**, which serves as the reference standard.

GI Classification

Glycemic Index	Category	Effect on Blood Sugar
70 or higher	High GI	Rapid rise in blood glucose
56–69	Moderate GI	Moderate rise in blood glucose
55 or lower	Low GI	Slower, more gradual rise

Natural sugars: These are sugars that occur naturally in whole foods such as fruits, vegetables, dairy, and honey rather than being refined or manufactured.

Common Natural Sugars

Sugar	Where It's Found
Fructose	Fruits, berries, apples, pears, honey
Glucose	Fruits, vegetables, honey
Sucrose	Sugar cane, sugar beets, many fruits
Lactose	Milk and dairy products
Maltose	Germinating grains, malted foods

Are "natural sugars" better than "refined" sugars: Once digested, the body cannot tell whether glucose came from an apple or a candy bar. All sugars raise blood glucose and insulin levels. The only advantage to getting your carbohydrates from "natural" sources is that this sugar can be accompanied by fiber, water, vitamins, minerals, and phytonutrients. These components slow glucose absorption and reduce metabolic stress compared with refined sugars like table sugar or high-fructose corn syrup.

Refined sugars: Sugars that have been extracted and processed from plants (usually sugar cane, sugar beets, or corn) and stripped of fiber, minerals, and natural structure. They are rapidly absorbed and tend to produce larger glucose and insulin spikes.

Common Examples of Refined Sugars

Refined Sugar	Source / Notes
Table sugar (sucrose)	Refined from sugar cane or sugar beets
High fructose corn syrup (HFCS)	Processed from corn starch
Corn syrup	Refined glucose syrup from corn
Dextrose	Pure glucose, highly refined
Glucose syrup	Industrial syrup used in processed foods
Maltose syrup	Derived from processed starches
Invert sugar	Sucrose split into glucose + fructose
Brown sugar	Refined white sugar with molasses added back
Powdered sugar	Finely ground refined sugar with anti-caking agents
Evaporated cane sugar	Essentially refined cane sugar marketed differently

Categories of Non-sugar Sweeteners

- Artificial
- Sugar alcohols
- Natural

The Most Common Non-Sugar Sweeteners:

Sucralose

- a.k.a. Splenda
- **Artificial**
- Source: derived from chemically-modified table sugar (sucrose)
- Glycemic index: 0
- 0 calories
- 600 times sweeter than sugar
- Blended with other sweeteners because of high potency
- Health benefits
    - No glucose spikes
    - Mild elevations of insulin
    - Low calorie diet advantage
    - Tooth-friendly—does not feed oral bacteria/no cavities
- Potential negative health effects:
    1. Reductions in beneficial gut bacteria
        - Changes in metabolism
        - Source of inflammation
        - Negative impact on the immune system
    2. May **increase insulin secretion in certain people**
    3. Slightly reduced insulin sensitivity
    4. Toxic compounds (e.g. chloropropanols) are produced when sucralose is heated
        - Hot beverages
        - Baking
        - **Health hazards of chloropropanols:**
            - **Kidney damage**
            - **Reproductive toxicity**
            - **Nerve damage**

Can Sucralose Cause Cancer? There is no human evidence that sucralose causes cancer at likely daily intake of (~350 mg).

Aspartame

- Aspartame
- a.k.a. NutraSweet & EQUAL
- **Artificial**
- Source: made by chemical coupling of aspartic acid and phenylalanine
- Glycemic index: 0
- ~ 0
- ~200× sweeter than table sugar
- Blended with other sweeteners because of high potency
- The most widely used sugar substitutes in the world
- Health benefits:
    - No glucose spikes
    - Mild elevations of insulin
    - Low calorie diet advantage
    - Tooth-friendly—does not feed oral bacteria/no cavities
- Potential negative health effects:
    1. Neurological symptoms: headaches, brain fog, light-headedness, irritibility, insomnia
    2. Digestion produces **Methanol => Formaldehyde => Formic acid**
        - Blindness
        - Neurological damage
        - Carcinogenic
    3. Reductions in beneficial gut bacteria
        - Changes in metabolism
        - Source of inflammation
        - Negative impact on the immune system

Can aspartame cause cancer? The International Agency for Research on Cancer classified aspartame in 2023 as: “possibly carcinogenic to humans”.

Saccharine

- a.k.a. **Sweet 'n' Low**
- **Artificial**
- Source: derived from chemically-modified table sugar (sucrose)
- Glycemic Index: 0
- 0 calories
- 600 times sweeter than sugar
- Health benefits:
    - No glucose spikes
    - Mild elevations of insulin
    - Low Calorie Diet advantage
    - Tooth-Friendly—does not feed oral bacteria/no cavities
- Potential Negative Health Effects:
    1. Historical cancer concerns in animal studies (rats). No Human evidence of cancer
    2. Possible damage to healthy gut microbiome
        - changes in metabolism
        - source of inflammation
        - negative impact on the immune system
    3. Potential changes in glucose metabolism **==> Insulin resistance**

Acesulfame Potassium

- **Artificial**
- 200x sweeter than table sugar
- Potential negative health effects:Gut microbiome disruption
    1. Weight gain from metabolic signaling changes
    2. Oxidative stress and blood vessel damage
    3. Headaches and brain fog

Erythritol

- A **sugar alcohol**

- Fermented from plant starch (corn, wheat, tapioca)
- Most of the time erythritol is blended with other sweeteners
    - e.g. Stevia or monk fruit
    - Balances sweetness
    - Reduces “bitter” after taste
    - Adds a “sugar-like” texture
- 60% as sweet as sugar
- Glycemic index: ~0
- Potential negative health effects:
    1. Higher blood levels of erythritol were associated with an increased risk of:
        - heart attack
        - stroke
        - cardiovascular death
    2. Digestive issues
        - bloating
        - Gas
        - Diarrhea
    3. Possible kidney injury at very high intake levels

Xylitol

- A **sugar alcohol**
- Chemically produced from corn cobs or birch wood fibers.
- ~100% as sweet as sugar
- Glycemic index: ~7–13
- It is widely used in sugar-free gum, mints, dental products, and low-sugar foods
- helps inhibit ***streptococcus mutans***, a major cause of tooth decay
- Potential negative health effects:
    1. Gastrointestinal distress
        - Bloating
        - Gas
        - Cramps
        - Diarrhea
    2. Possible kidney stress at high intake
    3. Extreme toxicity in **dogs**. Even small amounts can cause:
        - Vomiting
        - Seizures
        - Liver failure
        - Death => DO NOT FEED dogs toothpaste or gum

Sorbitol

- A **sugar alcohol**
- Produced by hydrogenating glucose derived from corn syrup
- Used as humectant in foods, pharmaceuticals, and personal care products
    - Humectants pull water in and keep things from drying out

- ~50–60% as sweet as sugar
- Glycemic index: 9
- Used in candy, chewing gum, protein bars, toothpaste, cough syrups, liquid medications, mouthwash, & skin care products
- Potential negative health effects:
    1. Gastrointestinal Distress
        - Bloating
        - Gas
        - Cramps
        - Diarrhea
    2. Worsening of Irritable Bowel Syndrome
    3. Role in Diabetic Complications Through internal metabolism
        - Nerve damage (neuropathy)
        - Cataracts
        - Retinal injury

Maltitol

- **A sugar alcohol**
- Produced by hydrogenating maltose, which is derived from corn or wheat starch.
- Glycemic index: 35 to 52
- Widely used in sugar-free candy, chocolate, baked goods, and protein bars
- 90% as sweet as sugar
- May still raise blood sugar significantly
- Potential negative health effects:
    1. Gastrointestinal distress
        - Bloating
        - Gas
        - Cramps
        - Diarrhea
    2. Higher blood sugar impact with elevated blood glucose and insulin levels

Mannitol

- A **sugar alcohol**
- 50% as sweet as table sugar
- Glycemic index: 0-2
- Chemically produced through hydrogenation of fructose or glucose
- Possible GI side effects: gas, bloating, diarrhea

Stevia

- **Natural sweetener**
- Derived from the plant ***Stevia rebaudiana***, native to Paraguay and Brazil
- Can have a bitter after-taste so often combined with other sweeteners
- Glycemic Index: 0
- 200–300 times sweeter than sugar

- Potential negative health effects:
    1. Possible GI symptoms:
        - Bloating
        - Nausea
        - Mild stomach upset
    2. Possible blood pressure lowering
        - Caution with individuals already taking antihypertensive medications
    3. Possible blood sugar lowering via enhanced blood glucose levels
        - Caution with individuals controlling blood glucose levels
    4. Potential reproductive or kidney effects in early animal studies

Monk Fruit

- **Natural sweetener**
- Derived from the fruit ***Siraitia grosvenorii*** (Southern China)
- Used in traditional Chinese medicine for centuries
- Typically combined with other sweeteners
- Glycemic index: 0
- 150–250 times sweeter than sugar
- Potential negative health effects:
    1. Possible GI symptoms:
        - Bloating
        - Gas
        - Mild stomach cramping
    2. Possible allergic reactions (rare)

Monk fruit is considered safe by the **U.S. Food and Drug Administration.**

Spotlight on: ALLULOSE

- Rare, **natural sugar**
- Found in figs, raisins, jackfruit, wheat, maple syrup
- Typically made from: **Corn Starch => Glucose => Fructose => Allulose**
- ****because it can be corn-based => Buy "Organic" Allulose**
- Its molecular formula is the same as fructose ($C_6H_{12}O_6$), but the atoms are arranged slightly differently
- Because of that small structural difference, the body absorbs it but barely metabolizes it, so it contributes almost no usable calories
- 70% as sweet as sugar
- Glycemic index— 0 to 1

Why I Love Allulose:	
Minimal Effect on Blood Glucose	• Produces little to no increase in blood glucose levels. • May help maintain stable blood sugar. • May reduce post-meal glucose spikes when consumed with carbohydrates. • Similar to the diabetic drug ***Metformin***
Reduced Insulin Response	• Triggers minimal insulin secretion. • May help reduce chronic hyperinsulinemia. • May improve overall insulin sensitivity.
Weight Management	• Provides almost zero usable calories (~0.2–0.4 kcal/g). • May increase fat oxidation and energy expenditure. • Studies show potential reductions in body fat composition.
Anti-Obesity Effects	• May decrease adipocyte (fat cell) size. • May suppress enzymes involved in fat storage. • Observed reductions in weight gain in animal studies.
Improved Lipid Profile	• Some studies suggest reduced triglycerides. • Possible decrease in LDL cholesterol. • Possible increase in HDL ("the Good") cholesterol.

Reduced Liver Fat	• May reduce hepatic triglyceride accumulation. • May increase fatty acid oxidation in the liver. • Potential benefit for non-alcoholic fatty liver disease (NAFLD).
*Possible GLP-1 Stimulation	• May stimulate gut hormones such as GLP-1. • May slow gastric emptying. • May modestly improve glucose regulation.
Appetite Regulation	• Some evidence suggests increased satiety. • May reduce caloric intake in subsequent meals.
Dental Health	• Not fermented efficiently by oral bacteria. • Does not promote dental caries (tooth decay).
Potential Gut Microbiome Benefits	• May support beneficial gut bacteria. • Possible mild prebiotic effects.

Any Potential Negative Health Effects of Allulose?

- Limited Long-Term Human Data
- The most common side effect is **digestive discomfort** when large amounts are consumed
    - Gas
    - Bloating
    - Cramping
- Possible Mild Laxative Effect (Some may think this is a good thing)
- possible blood sugar lowering effects => Caution for Diabetics taking insulin

Common Food Items You Think Are Safe & Healthy, But Are Sweetened	
QUEST Bar Erythritol + Sucralose + Stevia	
Colgate Toothpaste Sorbitol + Saccharin + Sucralose + Xylitol	
IceBreakers Ice Cubes Gum Xylitol + Maltitol + Mannitol	
Vitamin Water Zero Sugar Stevia + Monk Fruit	
Russell Stover Sugar Free Toffee Maltitol + Stevia	
Coke Zero Aspartame + Acesulfame Potassium	

Diet Coke Aspartame	
Rebel Ice Cream Erythritol + Monk Fruit	
Kind Zero Monk Fruit + Allulose	
Coffee Mate ZERO Sucralose + Acesulfame Potassium	
Simple Truth Maple Flavored Syrup Allulose	

Summary of Concerns with Non-Sugar Sweeteners

Metabolic & Hormonal Effects

- Possible insulin elevation despite no sugar
- Potential impaired glucose tolerance in some individuals
- Possible contribution to insulin resistance with chronic intake
- May interfere with normal appetite regulation hormones

Gut & Microbiome Effects

- Potential alteration of gut microbiota
- Possible increase in intestinal permeability (“leaky gut”) in some studies
- Some sweeteners may promote dysbiosis

Digestive Effects (especially sugar alcohols)

- Common with erythritol, maltitol, xylitol, sorbitol, mannitol:
- Bloating
- Gas
- Abdominal discomfort
- Laxative effects / diarrhea

Appetite & Craving Effects

- May increase cravings for sweet foods
- Possible disruption of brain reward pathways
- Could lead to higher overall calorie intake in some people

Cardiometabolic Concerns

- Some studies suggest associations with:
- Weight gain
- Metabolic syndrome
- Cardiovascular disease risk markers
- Evidence is mixed and still debated.

Chemical or Toxicology Concerns (specific compounds)

- Aspartame: produces methanol and formaldehyde during metabolism
- Sucralose: may produce chlorinated byproducts when heated
- Ace-K: potential metabolic signaling concerns in animal studies

Potential Inflammatory / Oxidative Effects

- Some experimental research suggests possible:
- Oxidative stress, blood vessel injury, and "hardened" arteries
- Endothelial dysfunction
- Inflammatory signaling

Special Population Concerns

- Phenylketonuria (PKU) patients: must avoid aspartame
- Dogs: xylitol is extremely toxic

My Advice on Sugar and Sweeteners

1. Greatly reduce refined sugar.
Try to remove as much refined sugar from your diet as possible. Complete elimination is unrealistic in today's food environment, but awareness alone can dramatically reduce intake. After reading this newsletter, you should have a better understanding of where refined sugars and refined carbohydrates hide in everyday foods. Cutting back on these is one of the most effective ways to reduce insulin resistance, chronic inflammation, and metabolic disease.

2. Understand "natural" sugars.
Learn where natural sugars come from and recognize that they still raise blood glucose and insulin levels much like refined sugar. The advantage of natural sugars comes primarily from the fiber, micronutrients, water content, and slower metabolic absorption found in whole foods such as fruit. These foods are healthier choices, but natural sugars should still be consumed in moderation.

3. If you want sweetness, choose substitutes carefully.
Many people still enjoy a little sweetness during the day. In that case, look for safe and palatable non-sugar sweeteners or blends that provide sweetness without the metabolic burden of refined sugar.

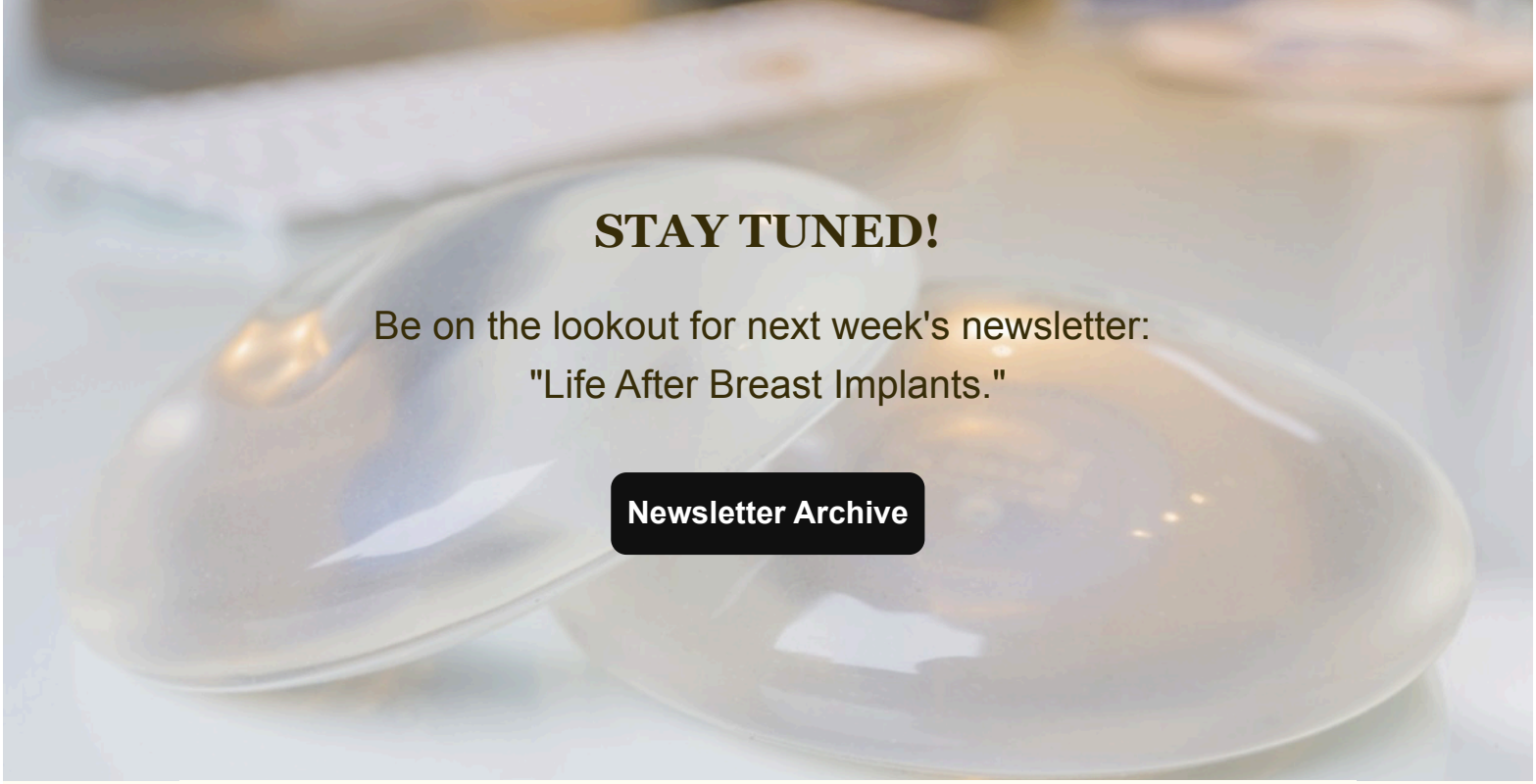
4. Be cautious with artificial sweeteners.
Based on the available science, it is wise to avoid most artificial sweeteners—particularly aspartame and saccharin. The metabolic byproducts and ongoing concerns surrounding potential carcinogenicity make them less desirable choices, even if regulatory agencies currently permit their use.

5. Sugar alcohols are somewhat better, but not perfect.

Sugar alcohols generally have a better safety profile and a low glycemic index, and they do not contribute to tooth decay. However, they often cause digestive issues such as bloating and gas and provide few meaningful health benefits beyond replacing sugar.

6. Favor natural non-sugar sweeteners.
A better long-term strategy is to use natural sweeteners such as stevia, monk fruit, and allulose, especially in balanced combinations that improve taste and reduce aftertaste.

7. Consider allulose.
Allulose is particularly promising. Used alone or blended with monk fruit or stevia, it offers sweetness with minimal impact on blood glucose and insulin. Early research even suggests potential metabolic benefits. A natural sweetener that is both safe and metabolically friendly could be a major step forward for those trying to reduce sugar without giving up sweetness entirely.



STAY TUNED!

Be on the lookout for next week's newsletter:
"Life After Breast Implants."

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Sieveking Plastic Surgery & MoreGlow Med Spa
1200 Old Hillsboro Rd., B2,
Franklin, TN 37069
info@sievekingplasticsurgery.com
615-321-1010

Ageless Solutions
615-678-7784