

# Link Between Insulin Resistance and Disease Acceleration

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## STORY AT-A-GLANCE

- › I've long warned that insulin resistance is at the foundation of most chronic disease, from heart disease and Type 2 diabetes to cancer
- › Researchers with the University of Copenhagen are now encouraging doctors to monitor blood sugar levels in their cancer patients after finding that many struggle with insulin resistance
- › In their systematic review and meta-analysis, they revealed cancer patients are "markedly insulin resistant"
- › Processed foods – which are loaded with added sugars, processed grains and industrially processed omega-6 seed oils rich in linoleic acid (LA) – are the primary culprits causing insulin resistance
- › Most cases of insulin resistance can be resolved via dietary changes, time restricted eating and enough daily movement

I've long warned that insulin resistance is at the foundation of most chronic disease, from heart disease and Type 2 diabetes to cancer. Now, researchers with the University of Copenhagen in Denmark are encouraging doctors to monitor blood sugar levels in their cancer patients after finding that many struggle with insulin resistance.<sup>1</sup>

"Insulin resistance is a critical cause of metabolic dysfunctions. Metabolic dysfunction is common in patients with cancer and is associated with higher cancer recurrence rates and reduced overall survival. Yet, insulin resistance is rarely considered in the

clinic,” the team explained.<sup>2</sup> In their systematic review and meta-analysis, they revealed cancer patients are “markedly insulin resistant,”<sup>3</sup> which should guide priorities for treatment and prevention.

## **Many Cancer Patients Are Insulin Resistant**

While insulin resistance is still not factored in to mainstream cancer treatment, it’s been known since the 1920s that cancer patients often had sweet-smelling urine due to high blood sugar levels.

“This was one of the first things we learned about cancer patients,” study author Lykke Sylow told SciTechDaily. “In cancer patients, the cells do not respond well to the hormone insulin. It therefore takes more insulin to create the same effect in cancer patients. If you suffer from insulin resistance, your body has to produce more insulin than usual to be able to regulate the blood sugar.”<sup>4</sup>

It’s not only people with cancer who tend to be insulin resistant, however. At least 40% of U.S. adults between the ages of 18 and 44 have insulin resistance, which is associated with obesity and Type 2 diabetes, as well as high blood pressure and limited physical activity.<sup>5</sup> Other estimates suggest even more Americans are insulin resistant, and that can be true even if your fasting glucose is normal.<sup>6</sup>

A bombshell study came out in July 2022, showing that in 2017 to 2018, only 6.8% of U.S. adults had optimal cardiometabolic health.<sup>7</sup> What this means is that more than 93% of U.S. adults are metabolically unfit, and the actual percentage is probably over 95%.<sup>8</sup>

Without lifestyle changes, Type 2 diabetes may develop about 10 to 15 years after insulin resistance begins. However, this isn’t the only consequence.<sup>9</sup> While insulin is essential to staying alive, insulin resistance accelerates the aging process and contributes to the development of degenerative diseases.

To compensate, your pancreas secretes more insulin into your bloodstream to lower your blood sugar. Insulin, however, is very efficient at lowering blood sugar by turning it into fat. The more you secrete, the more fat your body will accumulate.

“The metabolic consequences of insulin resistance can result in hyperglycemia, hypertension, dyslipidemia, hyperuricemia, elevated inflammatory markers, endothelial dysfunction, and a prothrombotic state,” according to the National Library of Medicine.<sup>10</sup> But cancer is also related.

“In cancer patients the cells do not respond well to the hormone insulin,” one of the study’s main authors, Lykke Sylow, explained. “It therefore takes more insulin to create the same effect in cancer patients. If you suffer from insulin resistance, your body has to produce more insulin than usual to be able to regulate the blood sugar.” And that, according to a second main author, Joan Màrmol, “can be a huge problem for cancer patients.”<sup>11</sup>

## **Alzheimer’s, Other Diseases Linked to Insulin Resistance**

The featured study suggested further research to determine if resolving insulin resistance in cancer patients could improve outcomes. In fact, it’s already known that resolving insulin resistance is important for optimal health and warding off most chronic diseases.

Alzheimer’s disease is intricately connected to insulin resistance;<sup>12</sup> even mild elevation of blood sugar is associated with an elevated risk for dementia.<sup>13</sup> Further, as noted in *Frontiers in Endocrinology*, “Insulin resistance (IR) plays a crucial role in the development and progression of metabolism-related diseases such as diabetes, hypertension, tumors, and nonalcoholic fatty liver disease, and provides the basis for a common understanding of these chronic diseases.”<sup>14</sup>

Chronic kidney disease, heart attack, coronary artery disease, vascular stiffness, polycystic ovarian syndrome and cerebrovascular diseases are also linked to insulin resistance.<sup>15</sup> In terms of cancer, insulin resistance may increase risk and worsen outcomes via multiple mechanisms, including chronic inflammation, promotion of cell proliferation, epigenetic modifications and gut dysbiosis.<sup>16</sup>

Its health consequences are varied and significant, as insulin resistance results in mitochondrial dysfunction. The process begins because your body is unable to burn fat as a primary fuel. When your body relies primarily on sugar instead, more reactive oxygen species (ROS) are generated, which damage the mitochondria in your cells.

## **What Causes Insulin Resistance – and What to Do About It?**

Insulin resistance is typically caused by lifestyle factors, especially poor diet choices. Specifically, processed foods – which are loaded with added sugars and processed grains. But, most deleterious are the industrially processed omega-6 seed oils rich in **linoleic acid** (LA) – which are the primary culprits causing insulin resistance.

The most important change to make is cutting out industrially processed seed oils, which are misleadingly labeled as vegetable oils. Examples of seed oils high in LA, which will radically increase oxidative free radicals and cause mitochondrial dysfunction,<sup>17</sup> include soybean, cottonseed, sunflower, rapeseed (canola), corn and safflower.<sup>18</sup>

In order to avoid LA, you'll need to avoid eating processed foods and most restaurant food and focus on real food instead. Consider cutting LA down to below 5 grams per day, which is close to what our ancestors consumed before chronic health conditions, including cancer, became widespread.

For most people it takes three years of a rigid seed oil restriction to normalize their tissue LA levels to healthy ranges. To be more specific, LA should be less than 2% of your daily calories. To keep track, enter your food data into Cronometer and it will calculate your percentage automatically.

Time-restricted eating is another important strategy. Our ancient ancestors did not have access to food 24/7, so our genetics are optimized to having food at variable intervals, not every few hours. When you eat every few hours for months, years or decades, never missing a meal, your body forgets how to burn fat as a fuel.

Most people who practice TRE limit the time they consume food to eight to 10 hours or less on most days of each week. In one study, adults with obesity who used an eight-hour eating window lost more weight, and had better improvements in diastolic blood pressure and mood, than those who used a 12-hour or more eating window.<sup>19</sup>

Fasting is also useful for Type 2 diabetes, leading to increased insulin sensitivity.<sup>20</sup> Once you regain insulin sensitivity, you can increase your food intake window to 10 to 12 hours.

## How to Keep Track of Your Blood Sugar Level

A blood sugar level over 90 mg/dl puts you in the danger zone for insulin resistance. Your blood sugar is measured through a glucose test, of which there are four types:

- 1. Fasting plasma glucose test** – When you fast overnight and take your blood sample in the morning
- 2. Oral glucose tolerance test** – Similar to the fasting blood sugar test, overnight fasting is required for this, and your fasting blood sugar level is measured. Afterward, a sugary liquid is provided and the levels are then tested for the next two hours
- 3. Hemoglobin A1C test** – This test checks the percentage of blood sugar attached to the hemoglobin and will indicate your average blood sugar level for the past two to three months
- 4. Random plasma glucose test** – This makes use of a blood sample that is taken at a random time

For most people, a simple at-home glucose test, where you prick your finger and deposit a drop of blood onto a glucose testing strip, will do the job.<sup>21</sup> Ideally, test yourself two to three times a day: first thing in the morning, before your first meal and a couple of hours after your last meal.

However, glucose levels can be deceptive because once you fast for a day or go low-carb, your blood glucose levels will decrease; but then they increase because your body requires a certain amount of glucose and your body increases cortisol to sacrifice protein from your muscles and bones to make it.

Your blood glucose levels will vary throughout the day. According to conventional recommendations, if you are healthy and do not have diabetes, your fasting blood glucose upon waking should be below 100 mg/dL. But I recommend aiming for a fasting (when you wake up) level below 90 mg/dL.

Before meal time, your glucose level should read between 70 to 99 mg/dL. After meals – or what's called "postprandial" and is usually taken two hours after eating – the level should be below 140 mg/dL. Keep in mind there are two measurements used for blood sugar levels.

In the U.S., the measurement is in milligrams of glucose per deciliter of blood (mg/dL). In the U.K. and Canada, the measurement for blood sugar is in millimoles/liter (mmol/L). To convert to mg/dL, multiply the amount by 18. So, if a person in the U.K. has a blood glucose result of 7 mmol/L, in the U.S. it's read as 126 mg/dL.

## **Berberine Helps Regulate Blood Sugar**

Insulin resistance is typically easy to resolve by making dietary changes. However, if you're looking for additional support, consider berberine, a compound that's extracted from goldenseal, barberry, Oregon grape and tree turmeric. It shows promise for helping to regulate blood pressure. In a 2022 systematic review of the literature, berberine reduced insulin levels, with the optimal dose being 1.8 grams a day.<sup>22</sup>

Berberine functions much like metformin, a commonly used medication for the treatment of diabetes. Both work, at least in part, by activating adenosine monophosphate-activated protein kinase (AMPK). Known as the "metabolic master switch," AMPK is an enzyme that controls how energy is produced in your body and how it's used by the cells.

By activating this enzyme, berberine and metformin help regulate the biological activities that normalize lipid, glucose and energy imbalances. Berberine, used in Chinese medicine to treat diabetes, has also been shown to counteract hepatic insulin resistance in diabetic rodents.<sup>23,24</sup>

Berberine may also help alleviate metabolic disorders via favorable effects on the gut microbiome, including strengthening intestinal barrier function and reducing inflammation.<sup>25</sup> Supplements like berberine should be used as part of a comprehensive strategy to optimize your blood sugar.

Exercise and daily movement are also important. One study published in *Medicine & Science in Sports & Exercise* found even a single session of moderate exercise can improve the way your body regulates glucose and reduces postprandial glucose spikes.<sup>26</sup>

So, whether you're specifically targeting cancer or not, taking steps to resolve insulin resistance is an important strategy for warding off chronic disease and maintaining optimal health.

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