Why We Test Insulin Blood Levels

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Customers who order our **blood test** panels often ask why we measure **fasting insulin**.

One reason is that *higher* **fasting insulin** levels are correlated with *lower* life expectancy[1] and *increased* risks of **cancer**[2-5] and **cardiovascular** disorders.[6-8]

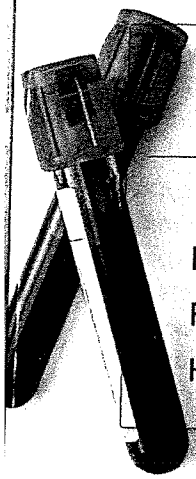
Insulin production is regulated by blood sugar levels and hormones. **Fasting insulin** increases in response to **insulin resistance.**[9,10]

At first, *higher* **insulin** levels can initially help drive **glucose** out of the blood into cells.[10]

As **insulin resistance** worsens, even *greater* **insulin** secretion fails to adequately normalize blood **glucose**.[10]

A missed opportunity for *early* diagnosis occurs when **fasting insulin** is omitted from blood panels that measure **glucose** and **A1c**.

Higher levels of **insulin** can temporarily reduce **glucose** and **A1c** in a way that masks **glycemic control** issues.[10]



Know Your GLYCEMIC BLOOD MARKERS

Target Interventions to Achieve:

Fasting Glucose ⟶ **80** to **86 mg/dL**

Fasting Insulin ⟶ **< 5 µIU/mL**

Hemoglobin A1c ⟶ **5.0** to **5.4%**

In other words, **glucose** and **A1c** may appear "normal" on blood test results. But without testing **fasting insulin**, this may create a false sense of security by not recognizing that the "excess" **insulin** is helping to keep **glucose** and **A1c** within acceptable ranges.[11]

Before full-blown **type II diabetes** manifests, suboptimal glycemic control is associated with increasing risks of the most common diseases[12] of aging.[13-16]

Further, worsening **glycemic control** can silently contribute to diabetes, leading to peripheral **nerve** damage (neuropathy), chronic **kidney** disease, and/or **loss of vision** (retinopathy).[17]

Newly diagnosed diabetics often ask why so *many* **morbidities** afflict them so quickly. The answer is these pathologies were festering for **years** as a result of suboptimal metabolic control, which could have been identified earlier with proper **blood tests**.

Some studies have shown that **fasting insulin** levels are a more accurate predictor of cardiometabolic risk, compared to tests for **insulin resistance.**[18,19]

One of the most serious global health problems today is **metabolic disorders** related to **obesity** and **insulin resistance.**[20,21] Effective methods (diet and exercise) can slow or halt progression to **type II diabetes**—but **prevention** is critical.

That's why it's essential to include **fasting insulin** with **glucose** and **A1c** blood testing to get a more accurate understanding of your glycemic status.

Type II diabetes is surging *higher* worldwide among all age groups.

The **Centers for Disease Control and Prevention** is running public service ads (one copied on this page) warning that **one** in **three** American adults is at risk for **prediabetes.**[20]

The term **"prediabetes"** can be misleading.

Few realize that the initial stages of glucose imbalance inflict severe tissue **damage.** This happens *before* full-blown type II diabetes is officially diagnosed.[16]

These pathologies are not limited to adults. There was an astounding **95%** increase in Americans under **age 20** living with **type II diabetes** between **2001-2017.**[22]

Need for Early Intervention

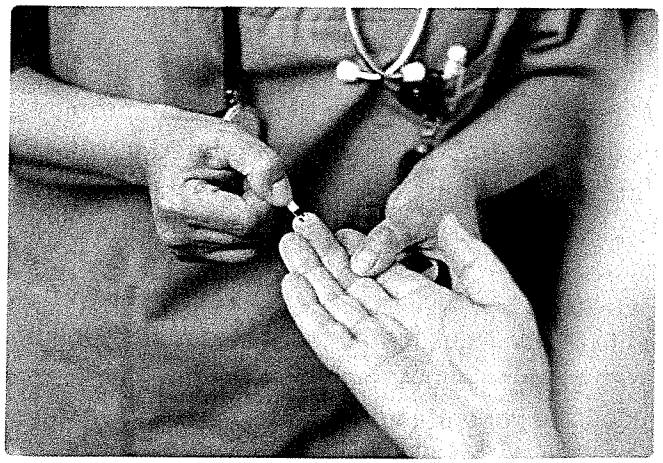
Most cases of **type II diabetes** begin when cells slowly become **resistant** to **insulin.**[20]

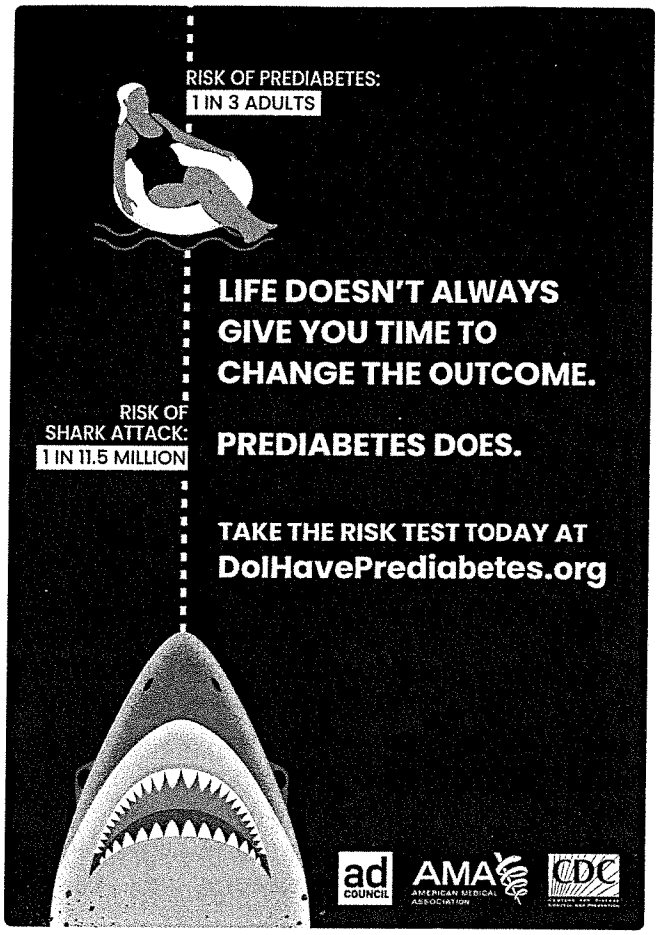
When this occurs, glucose buildup in blood causes the pancreas to secrete *higher* levels of **insulin** to force **glucose** into cells. This temporarily helps compensate for **insulin resistance** in target tissues (e.g., skeletal, muscle, liver).

During the period of **insulin resistance,** weight gain may be an outward sign of loss of **glycemic control.** This happens as elevated levels of glucose + insulin contribute to unwanted **fat storage.**[1,23]

Weight gain and physical inactivity increase the risk of developing **insulin resistance.**[20]

As **insulin resistance** worsens, insulin levels often rise as the pancreas attempts to compensate and literally *force* glucose into target tissues that have become **resistant** to the action of insulin at a cellular level.[1]





If a **blood test** reveals high **fasting insulin** before **glucose** and **A1c** become elevated, this provides an opportunity to identify diabetes *earlier* in the process, before extensive damage occurs.

Published data suggest elevated **fasting insulin** can be a useful diagnostic tool for identifying *early*-stage **insulin resistance.**[24]

One study found **insulin resistance** to be the most important predictive risk factor in the development of **coronary artery disease.**[25]

Other studies recognize the prognostic value of **fasting insulin** and suggest that **hyperinsulinemia** (high fasting insulin) is often both a result and a driver of **insulin resistance.**[16]

A consistent association exists between **hypertension** (high blood pressure) and elevated **insulin.**[26]

Mechanistic factors have been identified to explain why tissue damage associated with "excess" insulin and **insulin resistance** causes **blood pressure** to spike.[27]

Kidney Damage

Chronic kidney disease is surging, coinciding with an increased prevalence of obesity, hypertension, and diabetes.

Insulin resistance and **hypertension** predispose to premature **atherosclerosis**[28,29] and other pathologies that contribute to chronic kidney disease.[21,32]

Cardiometabolic syndrome, (a constellation of metabolic dysfunction characterized by insulin resistance, impaired glucose tolerance, dyslipidemia, hypertension, and intra-abdominal obesity) is associated with an increase in **cardiovascular disease**[33,34] and **kidney failure.**[35,36]

Recognition of the role of **insulin resistance** and **hyperinsulinemia** in **cardiometabolic syndrome** provides a rationale to measure **fasting insulin** blood levels.

Based on the currently available data, we believe that **fasting insulin** above **5 µIU/mL** is likely suboptimal. Steps that can be taken to improve metabolic health include a healthy, plant-based diet low in simple sugar, processed animal products, and saturated fat, and high in nutrients that help support metabolic health.[37]

Physical activity is also important for metabolic health.

Along with these lifestyle changes, and if appropriate for an individual based upon his/ her unique health needs, the use of medications under a physician's care, including **metformin**[38,39] and/or an **SGLT2 inhibitor**[40,41] like Jardiance® can further improve metabolic health before full-blown type II diabetes manifests.

Advanced-stage kidney disease is currently irreversible. Identifying causative risk factors *early* with blood tests that include **fasting insulin** can enable one to take corrective actions in time.

Cancer

Insulin has direct and indirect effects on **cancer cell** progression, proliferation, and metastasis.[42,43]

Studies investigating the association between **hyperinsulinemia** and cancer-related mortality have been inconsistent. Reasons might include the upper-limit reference range used to define **hyperinsulinemia.**

For example, the standard reference range for **fasting insulin** begins at **2.6 uIU/mL** and extends to a startling high of **24.9 uIU/mL.**[44]

Life Extension® long ago urged readers to target **fasting insulin** below **7.0 uIU/mL** with optimal **fasting insulin** below **5.0 uIU/mL.**

Today's laboratory reference ranges don't define **hyperinsulinemia** until **fasting insulin** rises above **24.9 uIU/mL.** This is **3-to-5-times** *higher* than what we consider optimal.

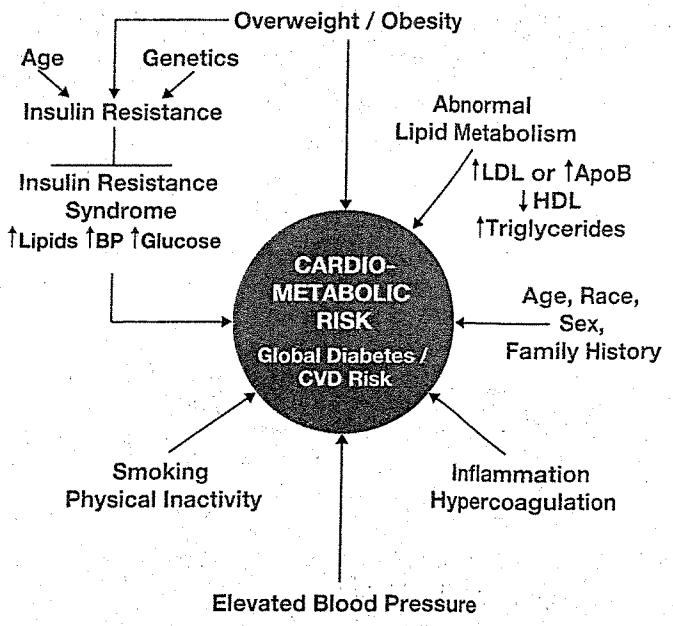
A study found **lung cancer** incidence doubled in men in the *highest* quartile of **fasting insulin** compared to those in the lowest insulin quartile. The conclusions from this study were:

"Higher fasting serum insulin concentrations, as well as the presence of insulin resistance, appear to be associated with an elevated risk of lung cancer."[45]

A gender-based subgroup analysis of seven different studies found significant association between **fasting insulin** and **cancer mortality.** The risk of **cancer mortality** in men with **high** insulin levels is almost double as compared to those having lower fasting insulin levels.[42]

Ignorance regarding "optimal" **fasting insulin** levels might be obscuring the impact of **high,** but "normal" **insulin resistance** markers on cancer risk and overall cancer mortality.

Factors that Predict Global Diabetes Mellitus and CVD risk.[60]



Why the controversy?

Life Extension® has published articles over the decades about the disease risks associated with excess **fasting insulin.**

Yet there are inconsistencies in the literature and in medical opinion as to what levels of fasting insulin increase disease risks.

One impediment in reaching consensus is varying definitions.

Hyperinsulinemia and Cancer

A massive review article (369 references) published in **2021** describes the health risks and mechanistic dangers of excess **insulin.**[46]

What follows is an excerpt from this review titled: "**Hyperinsulinemia in Obesity, Inflammation and Cancer**":

*"Hyperinsulinemia was associated with a **2-fold risk of cancer death.**[47] This increase of cancer mortality is also observed in people with normal body weight if they had hyperinsulinemia.[48] Therefore, hyperinsulinemia is associated with increased risk of both cancer incidence and death. However, unlike hyperglycemia, there is no widely accepted insulin concentration to define hyperinsulinemia, so it is difficult to compare across studies. Nevertheless, the rationale to study the contribution of hyperinsulinemia to cancer is strong."*

Hyperinsulinemia is sometimes defined as:[46]

"The amount of insulin in blood being higher than considered normal."

With laboratory reference ranges defining "normal" as high as **24.9 uIU/mL**, doctors who test **fasting insulin** may not realize the risks in patients with *higher* than **optimal** insulin levels.

We believe **fasting insulin** levels above **5.0-7.0 uIU/mL** may indicate cellular **insulin resistance**, yet today's laboratory reference ranges define normal as between **2.6** and **24.9 uIU/mL**.

A better definition of **hyperinsulinemia** is a condition in which:

"There are excess levels of insulin circulating in the blood relative to glucose."

Even this definition can make interpretation of blood test results challenging since the majority of Americans today are overweight and prone to large fluctuations in fasting glucose and insulin levels.

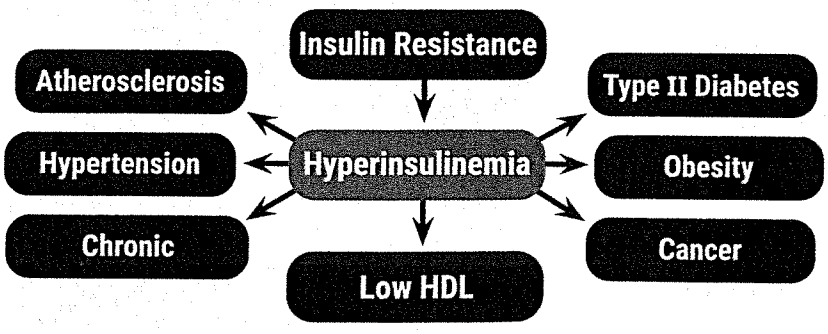
Even thin people can suffer from insulin resistance, which is another reason for testing blood for **fasting insulin.**

A mass education program about **insulin resistance** is urgently needed, along with knowledge that it can be detected *early* by properly interpreting **fasting insulin**, **glucose** and **A1c** blood test results.

What you can do today!

Insulin resistance can be reversed by aggressive dietary and lifestyle changes, including increases in physical activity.[40,49-54]

Nutrients with glucose-lowering effects can help in combination with diet and more physical activity. For some this is not enough, and for these individuals, medications like **metformin** and/or an **SGLT2**



Hyperinsulinemia is a risk factor for other diseases.

Excess insulin and insulin resistance cause deleterious changes in many biochemical pathways that can lead to a number of degenerative diseases and potentially life-threatening metabolic consequences.

inhibitor may also be needed to optimize metabolic health. SGLT2 inhibitors are sold under brand names that include Jardiance®, Farxiga®, Invokana® and others.

An **AMPK-activating** drug called **metformin** improves insulin sensitivity and can reduce **fasting insulin** levels indirectly, largely as a result of improvement in peripheral insulin sensitivity at the cellular level.[49,55]

Sodium-Glucose Co-Transporter 2 inhibitor (SGLT2 inhibitor) drugs increase urinary excretion of glucose from blood. This drug class helps reduce the progression of chronic kidney disease in patients with type II diabetes and reduces adverse cardiovascular outcomes in many of these patients.[56]

Some studies show **SGLT2 inhibitors** reduce **fasting insulin**, likely a result of the reduction of excess blood glucose.[57-59]

The first step, however, is **blood tests** that measure **glucose**, **A1c** and **fasting insulin**.

We suggest you target:

- **Fasting Glucose** between **80-86 mg/dL**
- **Hemoglobin A1c** between **5.0%-5.4%**
- **Fasting Insulin <5 µIU/mL**

While these numbers are not achievable by everyone, you can at least lower them to safer ranges by initiating steps to improve glycemic status.

A popular blood test panel outlined on the next page includes A1c, glucose, fasting insulin, lipids, C-reactive protein, and other measures.

Commercial labs charge about $**2,000** for these tests, but once a year we discount the popular **Male** and **Female Panels** down to **$224**.

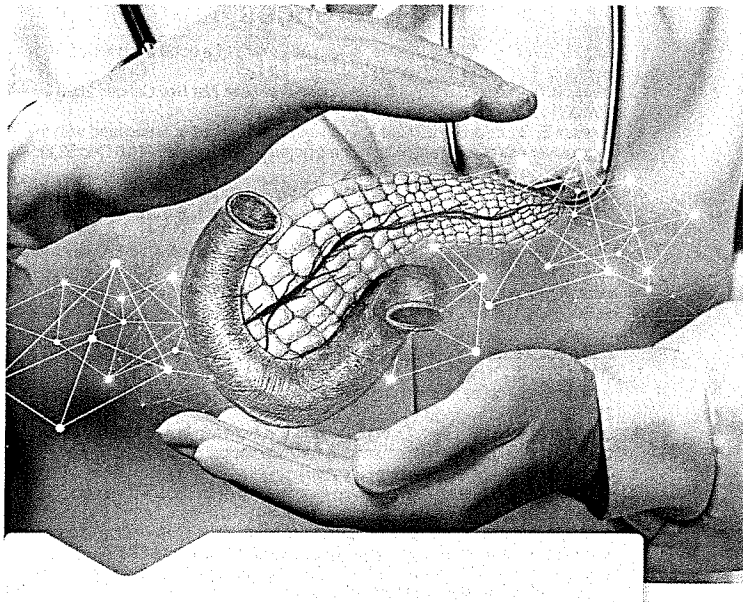
You can order these tests 24 hours/day by calling **1-800-208-3444** or visting www.LifeExtenson.com/bloodtests

I hope this editorial explains why **fasting insulin** is included in many of our comprehensive blood test panels.

The article on page 24 of this issue describes an *easy-to-take* **fiber** approved by the **FDA** in **2020**. One of the benefits found with this soluble **plant fiber** is *reduced* **glucose** and **insulin** blood levels.

For longer life,

William Faloon, Co-Founder
LifeExtension®



Cellular Insulin Resistance

The cells of many people with impaired glycemic control tend to be more resistant to insulin-stimulated **glucose uptake** than those with normal glucose tolerance.

The ability of **insulin** to stimulate cellular **glucose uptake** varies widely among individuals.

Resistance to **insulin-stimulated** glucose uptake and compensatory **hyperinsulinemia** represents a basic defect in many patients in the *early* stage of **type II diabetes**.[1]

As the condition worsens, insulin-producing pancreatic cells fail, thus some type II diabetics to require **insulin injections**.[1]

Increases in pancreatic **insulin production** can temporarily prevent elevations of **glucose** and **A1c**. This does not mean that this compensatory (hyperinsulinemic) response is benign.

Early-stage diabetic development (and related complications) is predictable by including **fasting insulin** with conventional **blood test** panels.