



Lab Guide

A guide to understanding & monitoring your labs & hormones for ultimate metabolic health!



let's dive in!

Welcome!

If we haven't "met" before, I'm Bailee Hart, a Registered Dietitian Nutritionist specialized in blood sugar management & metabolism for women!

After working with hundreds of ladies, I know first hand how difficult (& anxiety-provoking) it can be communicating your requests to your healthcare provider. My hope is that this lab guide will help you understand your body better so that you can advocate for yourself & your needs more confidently at your healthcare appointments.

Knowledge is power!! This guide can help you understand which labs you should ideally have checked on a regular basis, and which labs can give you more information about your blood sugar, weight or metabolic-related symptoms!

Bailee Hart, RDN



Get The **Most** out of this Guide

Please keep in mind that looking deeper into labs is individualized and can vary depending on health goals, history & specific symptoms.

Highlight &/or take note of specific symptoms that apply to you so that you can summarize what to bring up at your appointment with your provider.

You can also use this guide to see which labs you may be missing that you should be checked into more regularly as part of your routine lab work.

Lastly, keep in mind that some lab results may include "optimal" goals outside of what may be considered "normal" in most traditional healthcare symptoms (ex: insulin). If this is the case, those are included in this lab guide. You can also always use the reference range included on your lab reports if available to compare/reference.

Common Barriers to Healthcare & Lab Requests

You've probably discovered that it can be difficult to request certain labs. Oftentimes, you'll get pushback for one reason or another from healthcare providers. Here are a few reasons why you may have found it difficult to request labs in the past (or potentially in the future)....

Lack of Time

Most providers are swamped with extensive paperwork & "red tape" insurance companies require from them for things like general medical coverage, often including lab orders, & medication approval! This often means they have less time to spend with patients, unfortunately.

Outdated Education

Traditional healthcare systems tend to use evidence that is ~10 years behind the newest, most up-to-date research. This combined with the fact that most healthcare providers are experts in medicine, and not nutrition (they receive just a couple nutrition classes at most during training) makes it difficult for healthcare providers to give you support/guidance you may need.

Treatment vs Prevention Focus

Unfortunately, traditional healthcare has primarily been focused on treatment for acute-care "illness". Insurance coverage for screenings & education for optimal preventative care is limited as well.

Insurance & Cost

Insurance may not cover all of the labs you request to have drawn. Your provider will not want you to end up with a surprise, large lab bill. Additionally, extra paperwork may be required by your provider for certain lab coverage.

Insulin Resistance

Need to Knows

Insulin Resistance Breakdown

What is it?

Insulin is a hormone that is released from your pancreas to help our bodies use glucose (sugar) for energy. Insulin acts a key to our cells by "unlocking" them so that the glucose (sugar) from our food can be let inside to be processed for us to be able to live & do whatever we need to do everyday!

Insulin is critical in helping our body maintain healthy blood sugar sugar levels. If glucose (sugar) from the food we eat cannot get into the cells to be used for energy, it stays in our blood leading to high blood sugars.

With insulin resistance, your body has to release more and more insulin over time in order to try to help your body to maintain healthy blood sugar levels.

Insulin Resistance & Body Size

BMI or weight should not be used alone to rule out (or assume diagnosis of) insulin resistance.

Insulin resistance occurs for those with various body weights research shows. Body composition (fat mass to lean muscle mass) can play a significant factor in the development of insulin resistance and progression to pre or type 2 diabetes, as well as other chronic conditions.

Insulin Resistance Lab Results Breakdown

LAB	OPTIMAL (U.S. units)	PRE DIABETES	T2 DIABETES
Fasting Glucose	70-90 mg/dL	100-125 mg/dL	≥ 126 mg/dL
A1c	$\leq 5.6\%$	5.7-6.4%	$\geq 6.5\%$
Oral Glucose Tolerance Test	< 140 mg/dL	140-199 mg/dL	≥ 200 mg/dL
Fasting Insulin	~ 6 mIU/L		

Monitoring blood sugars: frequency & criteria

Insulin resistance can be happening for years prior to impacting A1c or fasting blood sugar. Monitoring insulin resistance-related labs & your bodies ability to process & use carbohydrates should be monitored annually, at minimum.

Fasting glucose is typically checked with your routine lab work, but you can always confirm w/ your provider to ensure it's on your annual lab orders. An A1c is a better indicator of your body's overall blood sugar control (is an estimated average of your blood sugar control within the last 3 months), however it's not always covered by insurance.

Insulin Resistance Labs & Tests Breakdowns

Fasting Insulin

Tests measure of insulin levels in your body after a minimum 8-hour fast, ideally as soon as possible after waking. Evaluating insulin levels in combination with fasting glucose or an OGTT provides a more complete picture of how insulin your body is to the hormone insulin.

HgbA1c

Measures your recent 3-month average of blood sugar. This level provides a more accurate interpretation of what your overall blood sugar control. This lab result does not require you to be fasting. Note: A "normal" A1c or fasting glucose level does not rule out insulin resistance

Fasting Glucose

Measures your glucose levels at a particular time, and can reflect your glucose control within the past 24-hours. This test requires you to be fasting (minimum 8 hours), & ideally it's checked as soon as possible after waking. Fasting glucose is a simple test & can easily be checked at home if using a personal glucose monitor.

Oral Glucose Tolerance Test

Considered to be the gold-standard test to evaluate for impaired glucose tolerance (especially if A1c & fasting glucose are "normal"). An OGTT measures glucose levels prior to the test, and then again 2 hours after consuming a sugary drink provided by the lab. It's recommended to evaluate results along with an insulin level. Test con: inconvenient

HOMA-IR

HOMA-IR (homeostatic model assessment of insulin resistance) is a non-invasive way to measure insulin resistance. It's calculated using fasting insulin & fasting glucose levels, if available. A HOMA-IR score > 1.9 indicates early IR, & > 2.9 indicates significant IR. You can calculate your score using a free calculator online .

**Intense, insatiable hunger
even when eating enough**

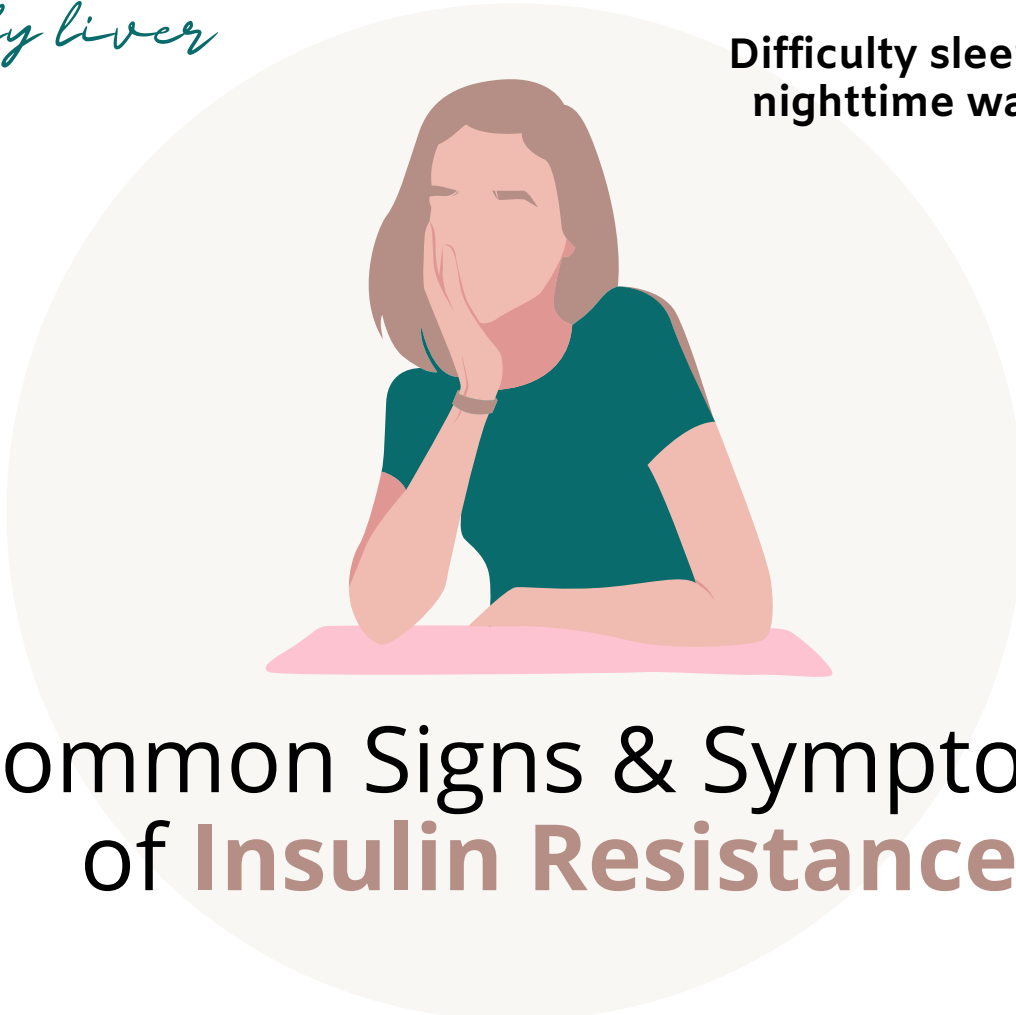
Carbohydrate
cravings

Poor energy & ongoing fatigue

Skin tags

Fatty liver

**Difficulty sleeping or
nighttime wakings**



Common Signs & Symptoms of **Insulin Resistance**

Elevated triglycerides

Elevated fasting glucose,
fasting insulin, A1c or OGTT

**Dark patches
on the skin**

Fasting insulin > 6

Chronic yeast infections

Low blood sugar symptoms often
between meals (shaky, sweaty, irritability)

insulin levels >60 mIU/dL after 2-hour
oral glucose tolerance test

Primary Labs **To Monitor**

Metabolic Health: Labs to Monitor

Underlying insulin resistance, inflammation &/or elevated blood sugars can affect your entire body. Checking the following labs on an annual basis helps you stay on top of your metabolic health markers so you can detect any changes or unexpected increases.

Heart Health

IR & elevated blood sugars increase inflammation & risk for developing cardiovascular disease. The following labs are typically included as part of your annual physical/labs as a "lipid panel", a panel helpful for assessing cardiovascular health.

- Triglycerides
- Total Cholesterol
- HDL Cholesterol
- LDL Cholesterol
- Blood Pressure

The best way to assess for overall heart disease risk is to calculate your Triglyceride/HDL ratio (goal is $\leq 2:1$ ratio). This ratio, gives a clearer & more accurate picture of your risk for heart disease, as opposed to evaluating a single result above.

Liver Health

IR can be associated with the development of NAFLD, non-alcoholic fatty liver disease. Liver function can be assessed by monitoring the following liver enzymes:

- AST (aspartate aminotransferase)
- ALT (alanine aminotransferase)

These should be a part of the "comprehensive metabolic panel" which is often drawn per protocol during annual physical exams.

use reference range on lab results for interpretation of above labs

Inflammation: Labs to Request

The labs listed below can give insight into evaluating excessive inflammation. Anti-inflammatory diet & lifestyle strategies are beneficial for everyone, so elevated lab results will not necessarily indicate a need for a change to your treatment plan.

hs-CRP (high-sensitivity C- reactive protein)

This test measures a high-sensitivity protein that is produced in the liver in response to inflammation. It also can be used in conjunction with a lipid panel to assess cardiovascular disease risk. Note: CRP test results can be elevated due to illness, and results do not give insight into location of inflammation. Optimal is <1 mg/L

WBC

This is included as part of a common lab panel included with your annual physical/lab work that is called a "complete blood count". Elevated WBC's can be an indicator for various health issues, but ongoing slightly elevated WBC levels can indicate chronic inflammation.

Total Cholesterol

As mentioned before, total cholesterol is typically ordered as part of your annual lab work with your yearly physical (can ask to be sure!) as part of a "lipid panel". While this gives a peek into your heart health, elevated total cholesterol can also be a sign of inflammation & oxidative (cellular) stress, hypothyroidism, or be an indicator of liver stress.

A high total cholesterol may also be related to nutrient abnormalities as well, such as low magnesium, low vitamin A or even low iodine. Goal: <200 mg/dL

Thyroid Health: Labs to Monitor

Hypothyroidism has been connected to IR and conditions related to blood sugar imbalance like pre & type 2 diabetes.

It's recommended that you request to have your thyroid labs checked when you're experience any of the following symptoms: hair loss, irregular or heavy periods, rapid weight gain or prolonged fat loss resistance, chronic fatigue, depression, chronic constipation, &/or always feeling cold.

Thyroid Labs Recommended for Evaluation

*request complete thyroid panel or the following individual labs + corresponding optimal lab results:

- *TSH: 0.8-1.0 uIU/mL or 0.5-3.0 mU/L depending on result unit
- Free T3: 3-4 mg/dL
- Free T4: 1-1.3 ng/dL
- *TPO antibodies: <10 or negative
- *TG antibodies: <20 or negative
- Reverse T3: <15 ng/dL

Thyroid Lab Considerations

Biotin supplements should not be taken prior to checking thyroid labs. Monitor TSH yearly after initial check.

**If symptoms of hypothyroidism present & TSH >2.5 mU/L, this is suspect for subclinical hypothyroidism. Testing antibodies helps screen for underlying autoimmune conditions that have specific nutrient requirements & recommendations, and testing ensure these conditions do not go untreated if present.

Nutrient Status Labs to Consider

Vitamin & or nutrient deficiencies are often related to IR, inflammation, and blood sugar condition onset &/or condition. The following labs should be considered for routine monitoring (some may not be covered by your insurance). These are not typically included with routine lab work/check-ups. If desired, you'll need to request they be added to your lab orders.

IRON

- 70-80% of iron is stored in Hemoglobin, often tested w/ routine annual labs (always double check)
- female optimal levels: 12.5-13.5g/L
- low values can correlate w/ low vitamin C, copper &/or vitamin A
- note: low Hemoglobin levels can falsely elevate A1c levels to a degree
- Request full iron panel if suspected anemia. Supplementing with iron w/out address iron recycling issue can cause inflammation

VITAMIN B12

- deficiency common for those that use Metformin, partake in a vegetarian or vegan diet or have used anti-reflux meds for 6+ months
- request to have checked annually with routine lab work (optimal 400-800 pg/mL)
- signs of deficiency: swollen tongue, anemia, numbness or tingling in limbs, difficulty concentrating
- if supplementing, typically ideal to supplement with B-complex rather than single B vitamins to prevent further imbalance

FOLATE

- deficiency co-exists often with B12 deficiency so also request testing if experiencing symptoms above (or have known B12 deficiency)
- Optimal levels: >4 ng/mL

VITAMIN D

- plays a role in managing blood sugar, inflammation, ovarian function, sleep, & mood
- check annually - healthy levels range from 40-70 ng/mL
- magnesium, a mineral easily depleted, is required for vitamin D activation. If vitamin D low, be sure to consume Mg-rich foods &/or supplement with Magnesium

ZINC

- deficiency common for those that partake in vegetarian or vegan diet or for females with PCOS.
- signs of zinc deficiency: delayed wound healing, frequent colds, white spots on fingernails, hair loss, hirsutism
- request to have lab ordered if concerned about the following above or if thinking about supplementing
- *zinc supplementation in excess can lead to a copper deficiency
- use lab result reference range

Preparing for your visit

Tips for requesting labs

Make a list of specific symptoms & labs that could give more insight into your symptoms or those you'd like to actively keep an eye on for prevention purposes. When requesting labs, it's good to add why you'd like the lab checked.

Example: "I've been experiencing a lot of unexplained weight gain & hair loss lately. Could we look into my insulin resistance & thyroid labs (& androgens if dx'd or suspected PCOS) so I can have a better understanding of how to best improve my symptoms?"

Be transparent about the fact that you'd like to request or discuss additional lab work rather than it being an afterthought at the end of the end appointment

Let your provider know that you would like to request some additional labs during your appointment &/or let your medical technician know prior to meeting with your provider. You can also send a message in an online portal to your provider's team if you have access to this.

Be honest that you're wanting to be proactive about your health. Make a list of labs you'd like to ensure are a part of your annual lab orders & include a quick note for yourself re: why you'd like it checked.

Example: "I'd like to check my fasting glucose, A1c, fasting insulin each year as well as a full lipid panel including triglycerides since I know that I have a family history of diabetes & my A1c has been elevated in the past. I also know that PCOS is a metabolic condition & I'd like to keep an eye on my heart health & blood sugar management so I can do my best to prevent heart disease &/or diabetes in the future."

Lab Request *List*

Use this space to write out a list of lab requests, symptoms, & related to your lab requests or recent lab results you'd like to discuss...

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Disclaimer

This guide is for education purposes only. Always consult with your doctor prior to ordering labs. This guide is not to be duplicated, copied or redistributed. Note, lab requests outside of the annual core labs may not be covered by your insurance provider.