VITALS VAULT

A VITALS VAULT FIELD GUIDE

Understand your labs around a GLP-1 medicine in 15 minutes

For anyone considering or taking a GLP-1 medicine: learn what blood tests show and track your own.

7

CHAPTERS

15 minutes

Every claim is tied to a named study. References are on the last page.

Educational only. Not medical advice.

THIS GUIDE IS FOR YOU IF

- You are considering a GLP-1 medicine and want to know which blood tests matter.
- You already take one and want to understand your follow-up results.
- You want muscle and nutrition markers on your radar while your weight changes.
- You want clear questions for your clinician and a page to track your own numbers.

HOW TO USE IT

Read one chapter at a time. Each opens with the one thing to remember. Use the question lists to prepare a visit, then fill in the tracking table in the last chapter with your own results. This guide explains labs. It is not medical advice.

WHAT IS INSIDE

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CHAPTER 1

Why a baseline comes first

THE ONE THING TO REMEMBER

Your numbers before any big body change are the only fair comparison later, so a baseline turns a vague result into a real change.

GLP-1 medicines copy a gut hormone that is released after you eat. It nudges the pancreas to release insulin, slows stomach emptying and quiets appetite through the brain. Because they touch blood sugar, insulin, the liver and eating habits, many blood markers can shift. Think of a baseline as a before photo. Without it, an after photo tells you very little.

70%

Up to 70% of the insulin released after a meal can come from gut hormones like GLP-1 (the incretin effect), per work cited in a clinician review. It is an upper estimate from one source.

WHAT A STUDY FOUND

Over 5,000 adults classed as normal by one fasting glucose were re-checked using a week of readings. Fasting glucose varied about 7.5 mg/dL from day to day. By the week's average, 40% were reclassified as prediabetic and 3% as diabetic. Limit: one study, using glucose sensors.

Shilo et al., Nature Medicine, 2024

COMMON BELIEF

"The number on the scale is the only number that counts"

WHAT THE EVIDENCE SAYS

Two people who each lose 20 pounds can differ inside: one mostly fat, the other a lot of muscle. Regulators' main trial endpoint is weight, not body composition. A clinician made this point from experience; it is not a trial result.

ASK YOUR CLINICIAN

- Which blood tests should I have on file before any treatment decision, or now if I have started?
- Can we also measure body composition, not only weight?
- Which of these tests will you repeat, and how often?

BRING TO YOUR FIRST VISIT

- [ ] Every medicine and supplement I take
- [ ] Past lab reports with dates and numbers
- [ ] Family history, including thyroid and diabetes
- [ ] My usual eating, drinking and movement habits

CHAPTER 2

The metabolic numbers: sugar, insulin, fats, liver

THE ONE THING TO REMEMBER

A1C, glucose, insulin, triglycerides and liver enzymes each tell a different part of the story, and one reading can mislead.

Glucose is the sugar in your blood right now. A1C (sugar averaged over about 3 months) works like a bank statement: it shows the average, not each purchase. Fasting insulin (the hormone that moves sugar into cells) can rise years before glucose does. Triglycerides are a blood fat. ALT and AST are liver enzymes that leak into blood when liver cells are stressed.

Marker	What it shows	Standard lab range (one source)
A1C	Average blood sugar, about 100–120 days	Under 5.7% normal; 6.5% or more diabetes
Fasting glucose	Sugar right now, after fasting	126 mg/dL or more meets the diabetes line
Fasting insulin	How hard the pancreas is working	2–19 uIU/mL
Triglycerides	Fat circulating in the blood	0–150 mg/dL
ALT	Liver enzyme, mostly from the liver	6–29 IU/L

WHAT A STUDY FOUND

About 2,000 adults with BMI 30 or higher and no type 2 diabetes joined a 68-week trial of a weekly GLP-1 medicine, with lifestyle counseling for all. Fasting insulin fell about 26% on the medicine versus about 7% on placebo. ALT fell about 24% and AST about 11%. Limit: markers moved along with weight loss.

Wilding et al., New England Journal of Medicine, 2021

COMMON BELIEF

"A1C is always a clean average of your blood sugar"

WHAT THE EVIDENCE SAYS

A1C depends on how long red blood cells live. Iron, B12 or folate deficiency can push it falsely high; blood loss or faster cell turnover can push it falsely low. In 87,284 adults without anemia or diabetes, lower hemoglobin went with higher A1C (Bae 2014).

Triglycerides: the standard top of normal is 150 mg/dL, yet in 15,355 people followed 22 years, all-cause death was 68% higher above 500 than below 100, and 100 to 149 also carried more risk (Klempfner 2016). This is observational. Levels above 1,000 mg/dL can trigger pancreatitis (inflamed pancreas).

ASK YOUR CLINICIAN

- **If my A1C and fasting glucose disagree, what is the next test?**
- **Which of my other medicines can change these numbers?**
- **Should fasting insulin be part of my baseline?**

CHAPTER 3

Muscle, protein and what body-composition studies found

THE ONE THING TO REMEMBER

Part of any weight lost is lean mass (everything that is not fat or bone), so function and protein matter, not only the scale.

Lean mass is everything that is not fat or bone: muscle, organs, connective tissue and water. A DEXA scan (low-dose X-ray body scan) reports it, but cannot separate muscle from the water and fat inside muscle. Think of weighing a suitcase: the scale cannot tell clothes from shoes. Losing fat inside muscle can read as lean loss even when muscle quality improves.

WHAT A STUDY FOUND

A meta-analysis found lean mass made up about 25% of weight lost with ordinary diet-and-exercise, about 25% with two GLP-1 medicines and about 33% with a third. Intensive lifestyle programs with resistance training lost only about 16% to 17% as lean mass. Limit: shares, not strength; bigger total loss means more lean mass lost in absolute terms.

Meta-analysis, Diabetes, Obesity and Metabolism, 2026

WHAT A STUDY FOUND

In a DEXA subset of about 140 people from a large weekly GLP-1 trial, average loss was about 8.4 kg of fat and 5.3 kg of lean mass, roughly 1.6 kg of fat per 1 kg of lean. A clinician says the ideal would be about 3 to 1. Limit: a small subset, DEXA's blind spots, and one clinician's target.

Wilding et al., New England Journal of Medicine, 2021

COMMON BELIEF

"Losing lean mass always means getting weaker"

WHAT THE EVIDENCE SAYS

In SEMALEAN (106 adults, average BMI 46), lean mass fell about 6.5 lb after a year, roughly 40% of weight lost, yet grip strength rose about 10 lb and sarcopenia (muscle loss with weakness) became less common. A lighter body needs less force to stand and climb. Limit: small, one group.

Protein figure	Where it comes from	Strength of evidence
0.8 g/kg a day	Official minimum (RDA)	Built to avoid wasting, not to be ideal
1.2 g/kg a day	Proposed floor for older adults	Expert perspective plus cohort data
1.2 to 1.6 g/kg	Added protein in training trials	One meta-analysis of about 49 trials
1.6 to 2.2 g/kg	Used in calorie deficit and hard training	Expert view, limited trials

ASK YOUR CLINICIAN

- **What protein range fits my size, kidneys and goals? These figures are not personal targets.**
- **How will we track strength and function, not only weight?**

CHAPTER 4

Hydration, kidney and electrolytes

THE ONE THING TO REMEMBER

Nausea, vomiting and diarrhea can drain fluid, and creatinine can mislead when muscle changes, so read kidney and salt numbers together.

Kidneys filter blood like a coffee filter. Creatinine (a muscle waste product) and eGFR (estimated filtering rate) show how well. BUN is waste from protein breakdown. Sodium and potassium are electrolytes (salts the body keeps in tight balance). Losing about 2% of body weight as water can cause mild dehydration, with fatigue, headache and slower thinking (Benelam and Wyness, 2010).

WHAT A STUDY FOUND

In two large trials of weekly GLP-1 medicines, nausea was reported by about 44% and 30% of people, diarrhea by about 30% and 23%, and vomiting by about 25% and 12%. Events came mostly early, and in one trial faded after about week 20 with a slow dose step-up. Limit: rough rates from different trials, doses and people.

Wilding et al., NEJM, 2021; Jastreboff et al., NEJM, 2022

Marker	What it reflects	Conventional range
Creatinine	Muscle waste plus kidney clearing	0.40–1.50 mg/dL
eGFR	Estimated kidney filtering	90 or more normal; 60–89 mildly decreased
Cystatin C	Filtering, less tied to muscle	0.5–1.00 mg/L
BUN	Protein waste; high with dehydration	7–25 mg/dL
Sodium	Water balance	135–146 mEq/L
Potassium	Heart and nerve salt	3.5–5.3 mEq/L

COMMON BELIEF

"Creatinine alone shows how healthy your kidneys are"

WHAT THE EVIDENCE SAYS

Creatinine comes from muscle, so low muscle mass gives a falsely low reading and kidneys look better than they are. One clinician's example: creatinine of 1.2 read as eGFR about 64 while cystatin C showed about 95. Limit: one example; labs still report creatinine-based eGFR.

24%

In one trial, major kidney events were 24% lower than on placebo (Perkovic 2024), discussed in the context of type 2 diabetes. Weight loss is a confounder, so a direct kidney effect is unproven.

WHAT A STUDY FOUND

In the ARIC cohort, serum sodium above 142 went with an older biological age and 39% more chronic disease; above 144, early death was 21% more likely. Lowest mortality sat at 137 to 142, and risk was 71% higher at 135 to 136.5. Limit: observational; the underhydration idea is the authors' hypothesis.

Dmitrieva et al., ARIC analysis, 2022

ASK YOUR CLINICIAN

- **Which kidney tests will you use, and should cystatin C be added if my muscle changes?**
- **How much fluid and salt suits me, given any heart or kidney condition?**
- **Which dehydration symptoms should make me call you?**

CHAPTER 5

Nutrients that can run low when you eat less

THE ONE THING TO REMEMBER

Eating less usually means less of the vitamins and minerals in food, so B12, iron stores, vitamin D and magnesium are worth knowing.

Six micronutrients are widely short even in wealthy countries: iron, zinc, folate, vitamin A, calcium and B12 (Beal and Ortenzi, 2022). Protein is a worry too: one dietary study estimated protein intake of only 33 g a day among people using these medicines, per a clinician review. Limit: survey data, no blood values, and one related survey was company-funded.

Marker	Why it can be low	Reading limit
B12	Absorbing it needs stomach acid and a healthy gut	Serum B12 alone can miss up to 45% of deficiency
Ferritin	Stored iron; low stores can come before anemia	Rises with inflammation, so can look falsely fine
Vitamin D	Often low in obesity; rose 7.7 ng/mL after weight loss	From one study in postmenopausal women
Magnesium	Low food intake and some medicines	Only 1-2% is in blood, so serum can look normal

WHAT A STUDY FOUND

Researchers recommend combining 2 to 4 markers (serum B12, holotranscobalamin, MMA, homocysteine) because serum B12 alone may miss up to 45% of deficient people. Homocysteine and MMA start rising once B12 falls below about 542 pg/mL. Limit: lab-based reviews; ranges differ between labs.

Fedosov et al., 2015; Smith et al., 2018

WHAT A STUDY FOUND

Reported ferritin cut-offs: below 30 ng/mL in healthy students had 100% sensitivity and 89% specificity for low bone-marrow iron, and 26 ng/mL best predicted anemia that iron treatment fixes. Low ferritin with a normal blood count can still come with fatigue. Limit: inflammation raises ferritin; sex differences conflict.

Daru et al., 2017; Al-Jafar et al., 2017

COMMON BELIEF

"A normal serum level means no shortage"

WHAT THE EVIDENCE SAYS

Magnesium sits mostly inside cells, with only 1% to 2% in blood, so cells can run short while serum looks normal. Serum B12 can also look fine while cells are short. Clinicians sometimes pair serum tests with functional markers.

ASK YOUR CLINICIAN

- Should B12, iron stores, vitamin D and magnesium be part of my baseline?
- Could fatigue or hair loss I notice be explained by a blood test?
- Do any of my medicines affect how I absorb these nutrients?

CHAPTER 6

Thyroid and other labs a clinician may check

THE ONE THING TO REMEMBER

TSH is the usual first thyroid test, and thyroid problems can mimic gut and energy symptoms, so ask what each test is for.

TSH (thyroid-stimulating hormone) works like a thermostat signal from the pituitary: when thyroid hormone runs low, TSH rises. The standard lab range is 0.40 to 4.50 mIU/L. A clinician often adds free T4 (the main thyroid hormone) and, if autoimmunity is suspected, thyroid antibodies. Thyroid labs help rule out other causes of fatigue, weight change or gut symptoms.

WHAT A STUDY FOUND

In a 20-year follow-up of 2,779 adults in Whickham, doubling TSH from 2.5 to 5 mIU/L raised the chance of later hypothyroidism (underactive thyroid) from 1% to 4%, and higher still with thyroid antibodies. Limit: an older cohort, an association, and most guidelines still treat 0.4 to 4.5 as normal.

Vanderpump et al., Whickham survey, 1995

WHAT A STUDY FOUND

In NHANES (9,020 adults), TSH and all-cause death formed a U shape: lowest risk at 1.2 to 1.95 mIU/L, higher at 0.34 to 1.19 and at 1.96 to 5.6. Limit: observational, the high-normal band was not split further, and it is one study's view, not a guideline cut-off.

Inoue et al., JAMA Network Open, 2019

COMMON BELIEF

"Digestive symptoms always come from the medicine"

WHAT THE EVIDENCE SAYS

Thyroid hormones set gut speed. An underactive thyroid slows it (constipation, slow stomach emptying); an overactive one speeds it (diarrhea). A 2024 review says gut symptoms can be the only clue to thyroid disease. Many things cause them, so note when they began.

Early rodent studies raised a thyroid cancer worry about this class. A systematic review found thyroid cancer in under 1% of treated people, but median follow-up was only 1 to 2 years, and experts differ on whether the risk is real. A regulator flags personal or family history of medullary thyroid cancer or MEN syndromes (rare inherited conditions) for prescribers, so bring your family history.

ASK YOUR CLINICIAN

- **Which thyroid tests do you run first, and when would you add antibodies?**
- **Does my family history change which labs we track?**
- **Could my digestive symptoms have another cause worth testing?**

CHAPTER 7

Your tracking page and questions for your clinician

THE ONE THING TO REMEMBER

A trend across your own results, measured the same way each time, tells you more than any single number.

Use the same lab and fasting rule when you can. Write the date and the lab's own range beside each result, because ranges differ between labs. Some markers also shift through the day: ALT is lowest around 4 am and highest around 4 pm. One result outside the range is a prompt to repeat or discuss, not a verdict.

Marker	Baseline (date)	Follow-up (date)	Follow-up (date)
A1C	____	____	____
Fasting glucose	____	____	____
Fasting insulin	____	____	____
Triglycerides	____	____	____
ALT / AST	____	____	____
Creatinine / eGFR	____	____	____
Sodium / potassium	____	____	____

WHAT A STUDY FOUND

In 2,533 adults with type 2 diabetes and eGFR of 60 or more at the start, a fall of 7.5% or more in one year, or 15% or more over two years, went with a poor kidney outlook. Each single result could look normal; the trend carried the warning. Limit: retrospective, people with diabetes.

Nojima et al., 2017

OTHER MARKERS AND BODY MEASURES

Vitamin B12 (value, date) _____

Ferritin (value, date) _____

Vitamin D, 25(OH)D (value, date) _____

Magnesium (value, date) _____

TSH (value, date) _____

Weight and waist (date) _____

Grip strength or body scan (date) _____

Average daily protein, grams _____

BRING TO EACH FOLLOW-UP

- [ ] Dates and numbers from this tracking table
- [ ] Medicines and supplements, and any changes
- [ ] Notes on side effects, thirst and appetite
- [ ] Questions I wrote down in advance

ASK YOUR CLINICIAN

- Which three markers matter most for me, and why?
- When should each test be repeated, and should I fast?
- Which results would make you add a test or change the plan?
- Who do I contact between visits if I feel dehydrated or unwell?

THE WHOLE GUIDE ON ONE PAGE

If you remember nothing else

1. A baseline before any big body change is the fair comparison for every later result.
2. One reading can mislead. A1C and fasting glucose vary, so trends beat single numbers.
3. A quarter to a third of weight lost was lean mass in pooled studies, so ask how strength is tracked.
4. Creatinine reflects muscle as well as kidneys, so cystatin C can help when muscle changes.
5. Nausea, vomiting and diarrhea can drain fluid. Sodium, potassium and BUN help show hydration.
6. B12, iron stores, vitamin D and magnesium are worth a baseline, but no single serum number says it all.
7. TSH is the usual first thyroid test, and thyroid problems can mimic gut and energy symptoms.
8. Keep your own page: same lab, dated results, the lab's own range and your questions ready.

WHAT THIS GUIDE CANNOT DO

This guide cannot tell you what your numbers mean for you, whether any medicine is right for you, or what to change. It reports what studies found, with their limits. Ranges vary by lab and population, and trial findings may not apply to you. Only your own results, tracked over time and read with a clinician, can answer that.

A FREE NEXT STEP

Read our free page on the blood markers behind metabolism and energy. It explains in plain language what glucose, insulin, thyroid and iron markers show.

vitalsvault.com/lp/metabolism-energy

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This guide is educational. It is not medical advice and not a diagnosis, and it does not replace a clinician who knows your history. Study findings describe groups of people and may not apply to you.