

Functional Health Report

A comprehensive analysis of your blood test results.

BLOOD CHEMISTRY ANALYSIS

Sample Client Report

Prepared for

Sample Client

[Personal details redacted]

Fasting

Requested by

Dr. Loree Pinnavaia, DC

Thriveology

Love your body for life



Collected

[Date redacted]

Reported

[Date redacted]

Lab

Quest Diagnostics

Powered by

Thriveology Functional Health Analytics

What's Inside?

SECTION 1: INTRODUCTION

An introduction to Functional Blood Chemistry Analysis and your Functional Health Report.

- 2 What's Inside?
- 4 FBCA Introduction
- 5 A Letter from Dr. Pinnavaia

SECTION 2: ANALYSIS

An in-depth analysis of every biomarker on your test, plus an out-of-optimal-range view.

- 8 Blood Test Results
- 17 Out of Optimal Range

SECTION 3: ASSESSMENT

Functional body system assessment, accessory systems, and nutrient status.

- 25 Functional Body Systems
- 28 Accessory Systems
- 29 Nutrient Status

SECTION 4: HEALTH CONCERNS

How the findings connect as a system, and the areas that most need support.

- 32 How the Findings Connect
- 34 Health Concerns Report

SECTION 5: DISCLAIMER

Important information about how to read this report.

- 41 Disclaimer

An introduction to Functional Blood Chemistry Analysis and your Functional Health Report (FHR).

Introduction

- 2 What's Inside?
- 4 FBCA Introduction
- 5 A Letter from Dr. Pinnavaia



Functional Blood Chemistry Analysis

Functional Blood Chemistry Analysis takes a deep dive into what your blood can tell us about your health. It is a structured way of sorting through every marker on your panel to get a clear picture of how your body's systems are functioning. Think of it as a thorough, system-by-system check-up — not just looking at whether each value falls inside the lab's broad reference range, but also asking whether each value is in the narrower zone that is associated with feeling and functioning at your best.

WHY BLOOD TESTING?

Your blood tells a comprehensive story about your health. The Comprehensive Metabolic Panel and Complete Blood Count are the two most frequently ordered panels in clinical medicine — together they offer a window into kidney and liver function, electrolytes, blood sugar regulation, anemia, and immune balance. Adding key thyroid, hormone, lipid, and inflammation markers gives us a panoramic view of your physiology.

Yet many people start to feel unwell long before traditional blood tests show anything obviously wrong. You may have heard a clinician say, "your labs are normal," even when you know you don't feel right. This is because lab reference ranges are derived from the average of all people who go for blood testing — many of whom are themselves unwell.

NORMAL IS NOT OPTIMAL

If you are feeling "unwell" but your blood test comes back "normal," it does not mean everything is fine. Clinical experience consistently shows that being statistically normal is quite different from being functionally optimal. You may not have a diagnosed disease, but it is entirely possible to be in a sub-optimal physiological state — and to feel the effects.

The issue is not with the tests themselves; they are powerful tools. The issue is with reference ranges that are too wide to detect early shifts in function.

THE FUNCTIONAL APPROACH

The functional approach to blood testing focuses on what your body's systems are *doing*, not just whether any single number falls outside the lab's standard. We use tighter functional ranges that flag changes long before disease is evident, and we look for patterns across multiple markers to understand what your body is really telling us.

Unlike the traditional approach, which examines each biomarker in isolation, Functional Blood Chemistry Analysis uses trends and relationships between biomarkers to uncover hidden risks and opportunities for improving your health.

THE FUNCTIONAL HEALTH REPORT

The Functional Health Report is the result of an in-depth algorithmic analysis of your blood test results paired with the clinical experience of Dr. Loree Pinnavaia. The report digs into the data, surfaces patterns in your physiology, and translates them into clear language so that we can build a plan together.

SUMMARY

Blood testing is no longer just a way to diagnose disease — it is a window into the body's functional state, and a key tool for promoting wellness and preventing chronic illness. This report is designed to translate your results into something actionable.

A Letter from Dr. Pinnavaia

Your report is the result of a detailed analysis of your complete and comprehensive blood biomarkers, combined with a clinical interpretation by Dr. Loree Pinnavaia, DC that draws on your health history and the goals you shared at your visit.

Dear Client,

Thank you for trusting me with your health.
[Personal history redacted for this sample.]

You came to me because the last year has taken something from you. Two years ago you were at your ideal weight, sleeping well and motivated. Then the hot flashes began, they broke your sleep, and since then your energy, mood, libido and body composition have all drifted — despite a clean paleo diet, no alcohol, and training five to six days a week. Your Quest panel from [date redacted] — 93 markers — tells a coherent story about why, and it is a story with several places we can intervene.

First, one result needs action this week. Your vitamin D is 196 ng/mL — nearly twice the top of the lab range and above the level where vitamin D can become toxic. It is all D3, so it is from your supplement, and 5,000 IU a day would not normally produce a level this high. Please stop all vitamin D now and check the label on your bottle (some products are 50,000 IU per drop or capsule) and any multivitamin you take. Your calcium is normal, so there is no sign of harm today; we will recheck vitamin D, calcium and PTH in 8-12 weeks. Drink plenty of water in the meantime — your BUN suggests you were under-hydrated at the draw, and high vitamin D asks more of the kidneys.

The thread that ties your symptoms together is energy signaling. You have Hashimoto's and have taken levothyroxine 50 mcg for years. Your T4 supply is good and — this is real good news — both thyroid antibodies are now undetectable. But levothyroxine is T4 only, and your body has to convert it to the active hormone, T3. Your Free T3 is just below our target and Reverse T3 sits at the top of its range: the body is slowing conversion, which it does when it senses scarcity — skipped meals, intermittent fasting, heavy training, broken sleep. Low active thyroid hormone slows metabolism, lowers mood and energy, encourages constipation, and reduces the liver's clearance of LDL cholesterol. The same scarcity signal raises SHBG (yours is 115), which binds up your testosterone; and it keeps cortisol elevated at the expense of DHEA (65) — the precursor to the testosterone that drives libido, motivation and muscle repair. In other words, the pattern behind your weight gain, fatigue, low libido and anxiety is largely one pattern.



Dr. Loree Pinnavaia, DC

Thriveology

Love your body for life

WHAT THIS REPORT COVERS

Analysis — every biomarker visualized against optimal and standard ranges.

Out of Optimal — every marker outside its functional range, with what it can mean.

Body Systems — algorithmic risk assessment for each major physiological system.

How It Connects — the pathways linking your findings to your symptoms.

Health Concerns — the areas where targeted support is most likely to help.

A Letter from Dr. Pinnavaia — continued

Your cardiovascular numbers need attention, and they connect to the same story. Total cholesterol is 264, LDL is 188 and Apolipoprotein B — the count of artery-affecting particles — is 138, in the lab's high-risk category. Your metabolic health is excellent (glucose 78, insulin 4.8, triglycerides 80, hs-CRP 0.7), so this is not insulin resistance. It is a particle-clearance pattern with three drivers: a saturated-fat-rich paleo diet in a lean, active woman (a well-described 'lean-mass hyper-responder' profile), low active thyroid hormone, and the estrogen decline of perimenopause. We will add a Lipoprotein(a) test because LDL near 190 warrants ruling out a genetic contribution, shift your fats toward olive oil, avocado, fish and nuts, add soluble fiber, and recheck ApoB in twelve weeks once thyroid conversion has improved.

On your hormones. Your estradiol on the gel is 53 pg/mL — absorbed, but at the low end of what typically controls hot flashes, so I would like you to review the dose with your OBGYN. Your serum progesterone reads below 0.5, but that number cannot judge a topical cream, which does not show up in serum; your difficulty falling asleep and your anxiety are the better guide, and they suggest progesterone support is not yet sufficient — oral micronized progesterone at bedtime is one option to raise with her. Freeing up your own testosterone by eating regularly will do more for libido than any supplement, and we can consider low-dose DHEA once your prescriber and I have coordinated.

Two findings are explained by your history. Your platelets are 114 — below range, but consistent with your known ITP, mild, and with every other blood cell line normal. This is a monitoring item, not an emergency; we will keep omega-3 at or below 2-3 grams a day and keep your hematologist in the loop. And your homocysteine of 10.2 with slightly enlarged red cells points to a vitamin B12 shortfall — not from diet (you eat B12-rich foods, and you do not drink), but likely from absorption: Hashimoto's travels with autoimmune gastritis, and your childhood antibiotics, food intolerances and constipation all point to the gut. Your pending GI-MAP will tell us a great deal. We will test B12 with methylmalonic acid and start methylated B12 meanwhile; B12 also supports mood, estrogen clearance and platelet production.

The changes that will move the most numbers at once are simple. Eat a protein-forward first meal within an hour or two of waking, even a small one, and stop skipping meals — this alone signals safety to the thyroid axis, lowers SHBG and cortisol, and evens out the after-meal glucose peaks behind your A1c of 5.4. Drink 2.5-3 liters of water daily. Swap one or two intense training sessions a week for walking or mobility while your recovery catches up (your recurring bursitis is telling you the same thing). Switch your magnesium to glycinate in the evening. Increase your omega-3 to an EPA-forward fish oil of about 2 grams a day with food — your omega-3 index is only 4.4 despite supplementing. Add selenium 200 mcg and zinc for thyroid conversion.

And there is much to be encouraged by: your blood sugar handling, triglycerides, HDL, iron stores, hemoglobin, liver enzymes, folate, inflammatory markers and thyroid antibodies are all exactly where we want them. Your foundations are strong; the system simply needs to be told it is safe to run at full speed again. The pages that follow lay out every marker against both the lab's range and our tighter functional range, show how your body systems connect, and rank where support will move the needle most. We will walk through it together.

With care,



Dr. Loree Pinnavaia, DC

Thriveology — Love your body for life

A full breakdown of every individual biomarker,
plus an out-of-optimal-range view.

Analysis

- 8 Blood Test Results
- 17 Out of Optimal Range



Blood Test Results

The Blood Test Results report lists every biomarker on your panel and shows where each one falls along a colored range. The bar progresses from **alarm-low**, through **low**, **below optimal**, **optimal**, **above optimal**, **high**, and **alarm-high**. The optimal zone is the tight functional range used at Thriveology — a value can fall inside the lab's standard range and still be sub-optimal.



BLOOD GLUCOSE

How the body handles fuel, hour to hour and over months. Fasting glucose and insulin show the baseline; HbA1c shows the 3-month average; the TyG index and Trig:HDL ratio are early insulin-resistance signals. Her baseline metabolism is excellent — the only shift is in the 3-month average, which points to meal timing rather than insulin resistance.

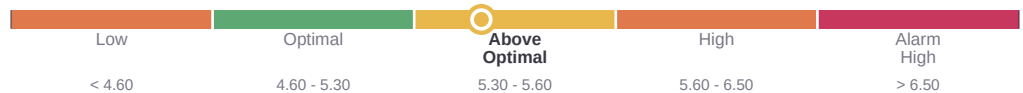
Glucose - Fasting

78 mg/dL



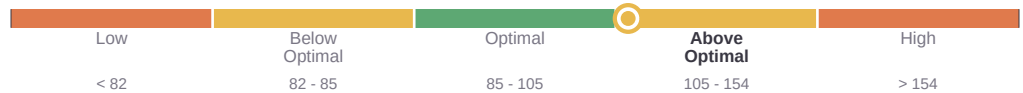
Hemoglobin A1C

5.40 %



Estimated Average Glucose (eAG)

108 mg/dL



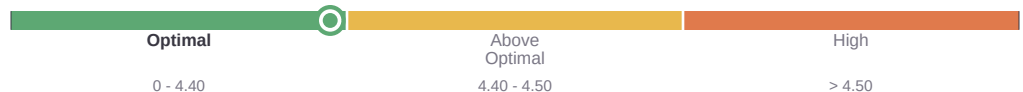
Insulin - Fasting

4.80 uIU/mL



Triglyceride-Glucose Index (TyG)

4.37 Index

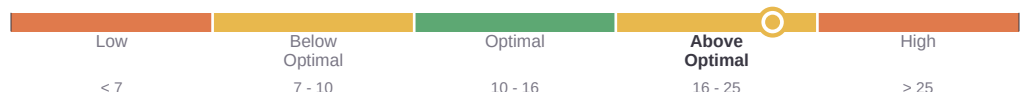


KIDNEY

The kidneys filter waste and regulate fluid, minerals and blood pressure. BUN rises with protein load and dehydration; creatinine tracks muscle mass and filtration; eGFR estimates filtration rate. Read together, they separate a hydration pattern from a kidney problem.

BUN

23 mg/dL



Creatinine

0.93 mg/dL

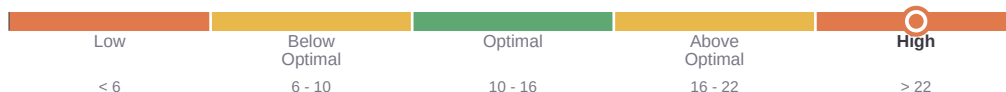


ANALYSIS

Blood Test Results Out of Optimal

BUN : Creatinine Ratio

24.70 Ratio



eGFR

78 mL/min/1.73m²

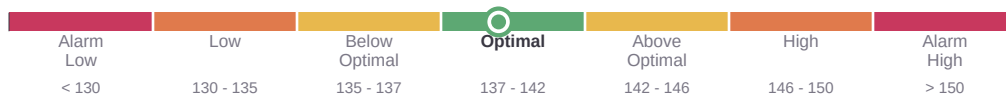


ELECTROLYTES

Sodium, potassium, chloride and bicarbonate keep fluid balance, nerve conduction, muscle contraction and acid-base status stable. The sodium:potassium ratio is a window on adrenal (aldosterone) regulation. All are optimal here.

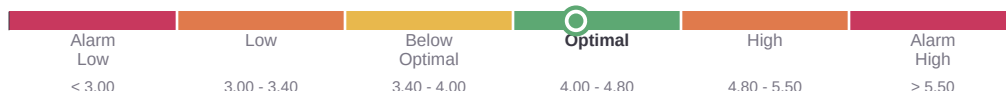
Sodium

139 mmol/L



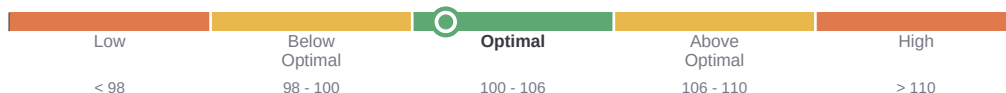
Potassium

4.30 mmol/L



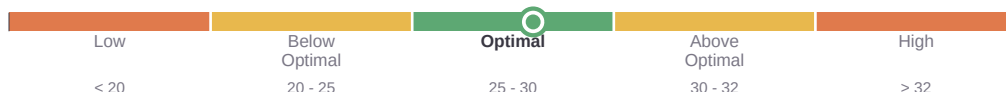
Chloride

101 mmol/L



CO2 (Bicarbonate)

28 mmol/L



Sodium : Potassium Ratio

32.30 Ratio

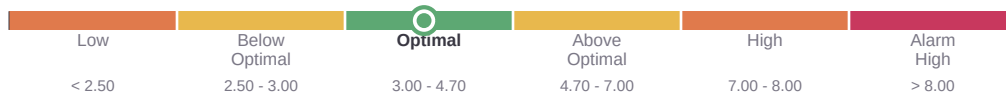


METABOLIC

Uric acid is both an antioxidant and a marker of purine turnover and fructose load; it rises with insulin resistance and falls with low protein or molybdenum intake.

Uric Acid

3.80 mg/dL

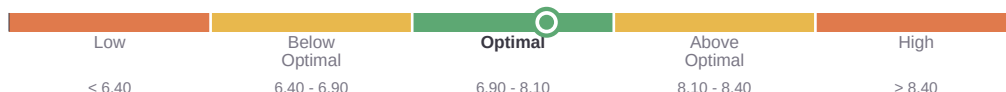


PROTEINS

Albumin reflects liver output, hydration and long-term protein status; globulins are the immune and transport proteins. Their ratio is an inflammation index. Because dehydration concentrates every protein, these values are read alongside BUN.

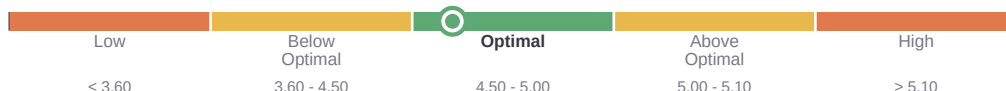
Protein - Total

7.70 g/dL



Albumin

4.60 g/dL

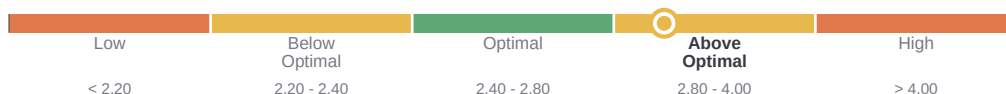


ANALYSIS

Blood Test Results Out of Optimal

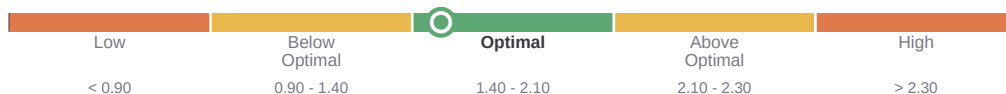
Globulin - Total

3.10 g/dL



Albumin : Globulin Ratio

1.50 Ratio

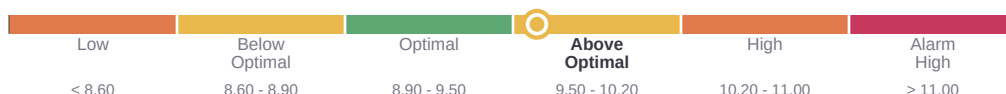


MINERALS

Calcium is regulated by parathyroid hormone and vitamin D and must be interpreted against her very high vitamin D. RBC magnesium reflects the intracellular stores that hundreds of enzymes — including those governing sleep, muscle relaxation and thyroid conversion — depend on.

Calcium

9.60 mg/dL



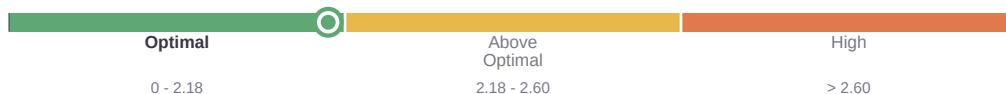
Magnesium - RBC

5.80 mg/dL



Calcium : Albumin Ratio

2.09 Ratio

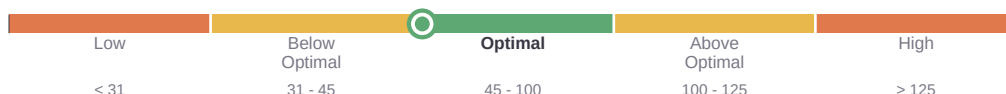


LIVER AND GB

The liver clears hormones, cholesterol and toxins and makes bile; the gallbladder stores it. Enzymes (AST, ALT, GGT, alkaline phosphatase) signal cell stress or bile flow; bilirubin tracks red cell breakdown and processing. Her liver markers are reassuringly quiet.

Alkaline Phosphatase

46 U/L



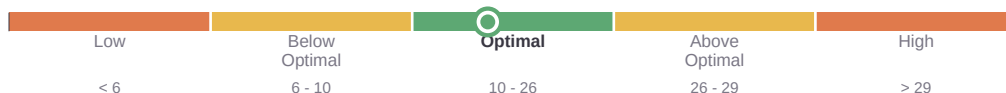
AST

19 U/L



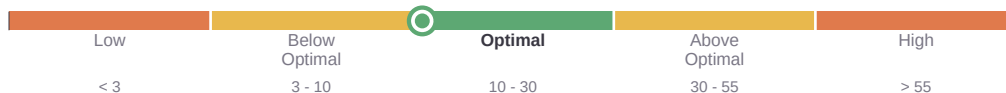
ALT

16 U/L



GGT

10 U/L



LDH

127 U/L



Bilirubin - Total

0.50 mg/dL



ANALYSIS

Blood Test Results Out of Optimal

Bilirubin - Direct

0.10 mg/dL



Bilirubin - Indirect

0.40 mg/dL

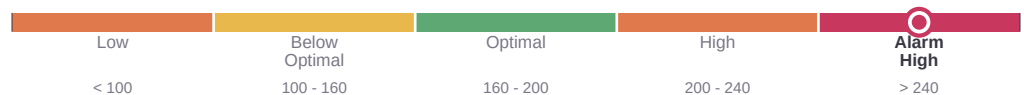


LIPIDS

Cholesterol is the raw material for cell membranes, sex hormones, cortisol, vitamin D and bile. The liver clears LDL through receptors that are up-regulated by thyroid hormone and estrogen and down-regulated by dietary saturated fat — which is why her lipid panel is read together with her thyroid, hormone and dietary pattern. Triglycerides and HDL are optimal; the entire elevation sits in LDL particles.

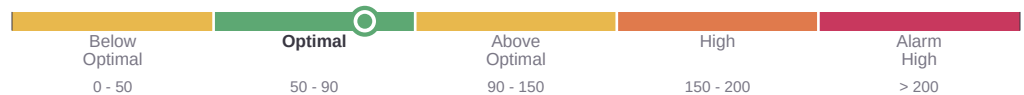
Cholesterol - Total

264 mg/dL



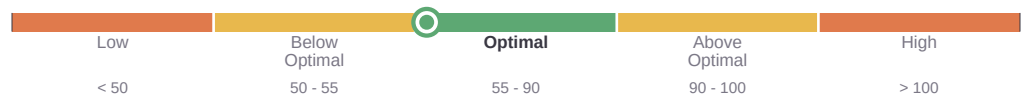
Triglycerides

80 mg/dL



HDL Cholesterol

57 mg/dL



VLDL Cholesterol

16 mg/dL



LDL Cholesterol

188 mg/dL



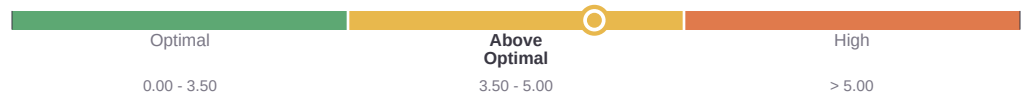
Non-HDL Cholesterol

207 mg/dL



Cholesterol : HDL Ratio

4.60 Ratio



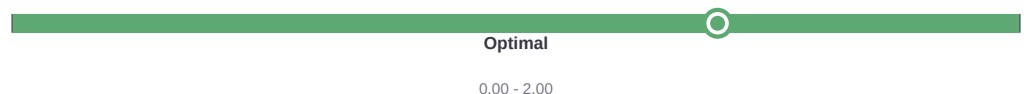
LDL : HDL Ratio

3.30 Ratio



Triglycerides : HDL Ratio

1.40 Ratio



ANALYSIS

Blood Test Results Out of Optimal

LIPOPROTEINS

Apolipoprotein B counts the atherogenic particles directly — one ApoB per LDL, VLDL or IDL particle — and is the most accurate single predictor of cardiovascular risk on a lipid panel.

Apolipoprotein B

138 mg/dL



INFLAMMATION

hs-CRP and ESR measure active inflammation; homocysteine measures methylation and B-vitamin sufficiency and is an independent vascular and neurological risk factor. Her active inflammation is low; her homocysteine is the marker to work on.

hs-CRP (Cardiac)

0.70 mg/L



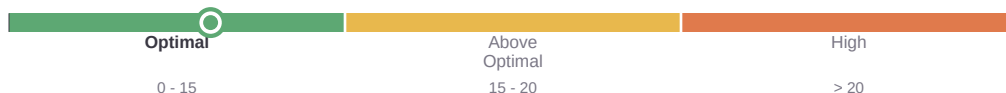
Homocysteine

10.20 umol/L



ESR (Sedimentation Rate)

9 mm/hr

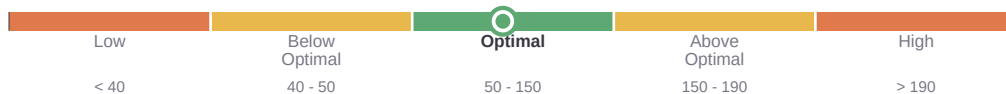


IRON MARKERS

Iron carries oxygen and drives energy production and thyroid hormone conversion. Serum iron, binding capacity, saturation and ferritin (stores) are read as a set. Her iron status is fully optimal — one variable that can be ruled out for her fatigue.

Iron - Serum

95 mcg/dL



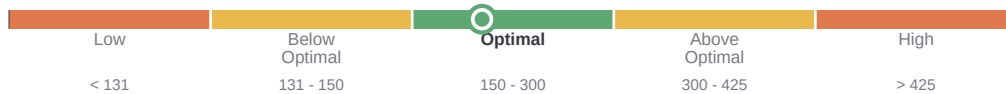
TIBC (Total Iron Binding Capacity)

297 mcg/dL



UIBC (Unsaturated Iron Binding Capacity)

202 mcg/dL



Ferritin

80 ng/mL



Transferrin Saturation

32 %

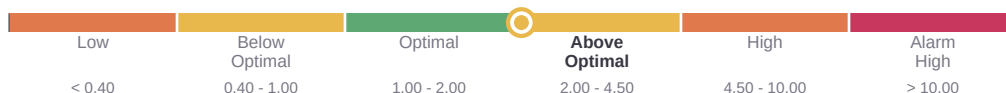


THYROID

The thyroid sets metabolic rate, temperature, energy, mood, bowel motility and cholesterol clearance. She has Hashimoto's and takes levothyroxine (T4). TSH shows pituitary feedback; Total T4 and the Free Thyroxine Index show T4 supply; Free T3 shows how much active hormone is being made from it; Reverse T3 shows how much is being shunted to the inactive form. Antibodies measure autoimmune activity — and her are undetectable.

TSH

2.07 mIU/L



T4 (Total Thyroxine)

9.00 mcg/dL



T3 Uptake

28 %



Free Thyroxine Index (T7)

2.50 Index



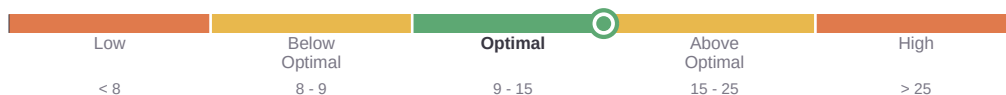
Free T3

2.90 pg/mL



Reverse T3

15 ng/dL



Free T3 : Reverse T3 Ratio

1.93 Ratio



TPO Antibody

<1 IU/mL



Thyroglobulin Antibody

<2 IU/mL



HORMONES

Sex and adrenal hormones govern libido, sleep, mood, body composition and tissue repair, and they are tightly interlinked: SHBG controls how much estradiol and testosterone is usable; DHEA-S is the precursor to testosterone; cortisol competes with progesterone and DHEA for resources. Her is using transdermal estradiol and topical progesterone, which shapes how her estradiol and progesterone results are read.

Testosterone - Total (Female, LC/MS/MS)

18 ng/dL



ANALYSIS

Blood Test Results Out of Optimal

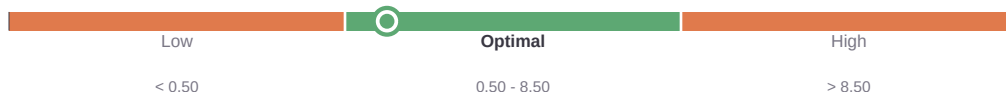
Testosterone - Free (Female)

0.70 pg/mL



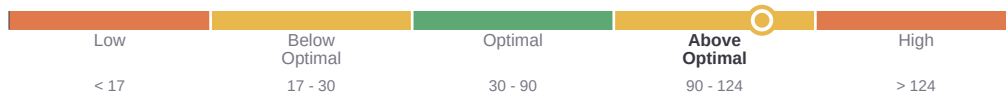
Testosterone - Bioavailable

1.50 ng/dL



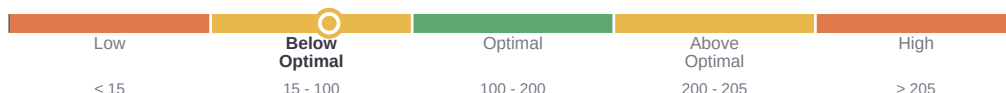
Sex Hormone Binding Globulin

115 nmol/L



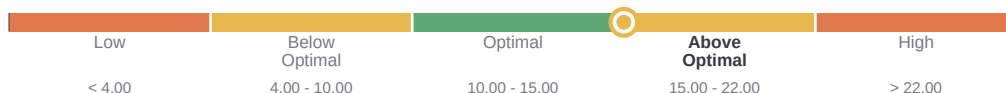
DHEA-Sulfate (Female)

65 mcg/dL



Cortisol - AM (Serum)

15.20 mcg/dL



Estradiol (on transdermal estradiol)

53 pg/mL



Progesterone (on topical progesterone)

<0.5 ng/mL

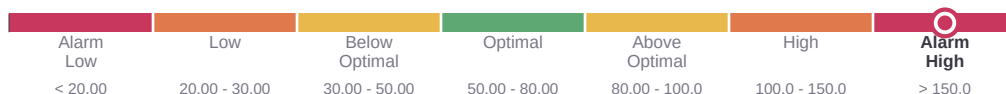


VITAMINS

Vitamin D governs calcium handling and immune tolerance; RBC folate reflects tissue folate stores. Her vitamin D is the highest-priority finding on the panel — for excess, not deficiency.

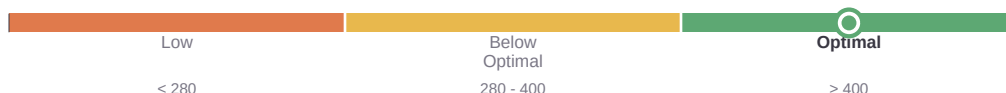
Vitamin D, 25-Hydroxy (Total)

196 ng/mL



Folate - RBC

595 ng/mL

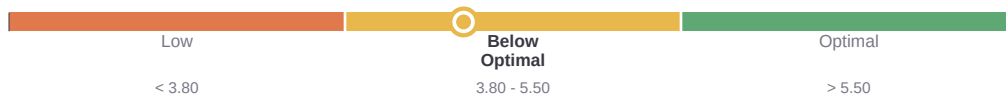


FATTY ACIDS

The fatty acids in cell membranes determine how readily the body produces inflammatory versus anti-inflammatory signals. OmegaCheck (EPA+DPA+DHA) is a cardiovascular risk marker in its own right; the AA:EPA and omega-6:omega-3 ratios describe inflammatory tone. Her levels are moderate despite supplementation, which raises questions of dose and absorption.

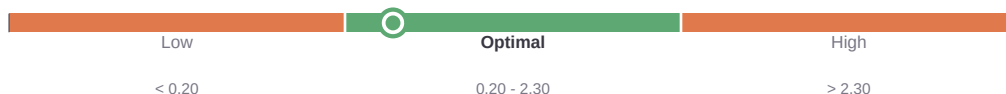
OmegaCheck (EPA+DPA+DHA)

4.40 % by wt



EPA (Eicosapentaenoic Acid)

0.50 % by wt

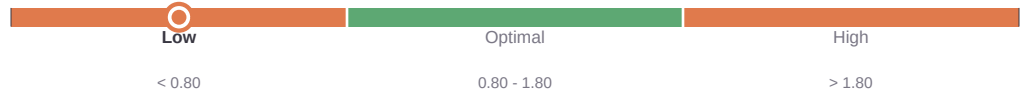


ANALYSIS

Blood Test Results Out of Optimal

DPA (Docosapentaenoic Acid)

0.70 % by wt



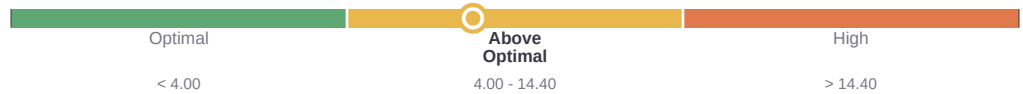
DHA (Docosahexaenoic Acid)

3.20 % by wt



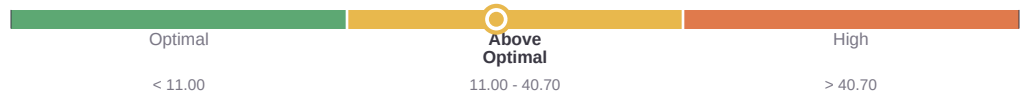
Omega-6 : Omega-3 Ratio

7.90 Ratio



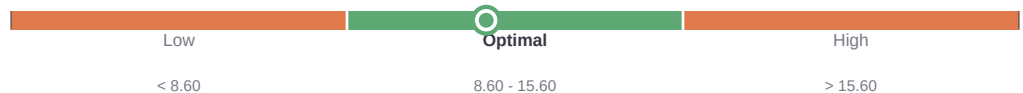
Arachidonic Acid : EPA Ratio

24.20 Ratio



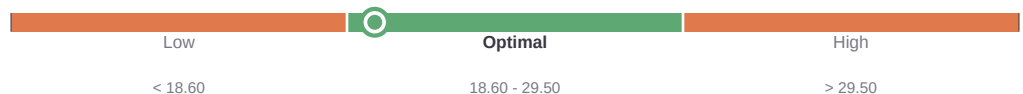
Arachidonic Acid

11.50 % by wt



Linoleic Acid

19.50 % by wt



CBC

Red cells carry oxygen; platelets clot; white cells defend. Cell size (MCV, RDW) reveals B12 and folate status. Her red cell mass is excellent; her platelet count reflects known ITP; and her cell-size indices point toward B12.

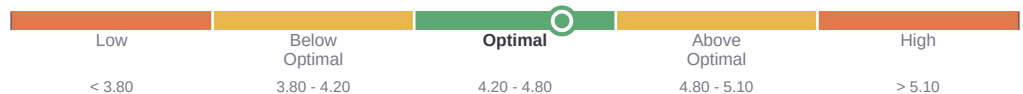
White Blood Cell Count (WBC)

4.90 $\times 10^3/\mu\text{L}$



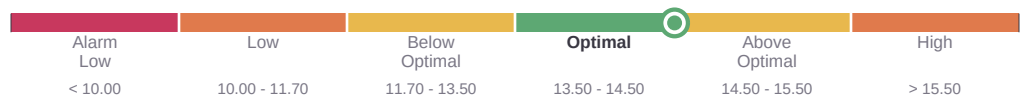
Red Blood Cell Count (RBC)

4.64 $\times 10^6/\mu\text{L}$



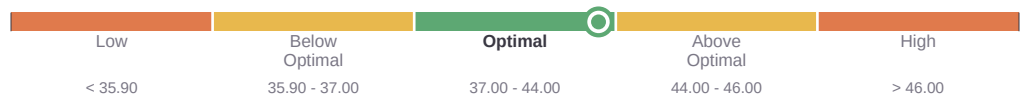
Hemoglobin

14.50 g/dL



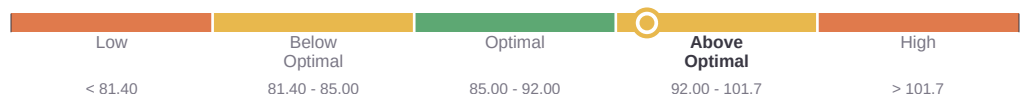
Hematocrit

43.40 %



MCV (Mean Cell Volume)

93.50 fL



MCH (Mean Cell Hemoglobin)

31.30 pg



ANALYSIS

Blood Test Results Out of Optimal

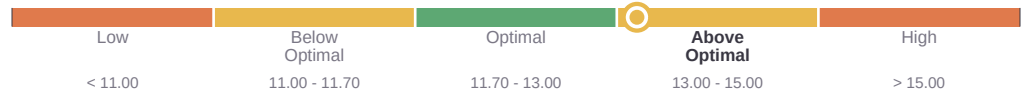
MCHC (Mean Cell Hgb Concentration)

33.40 g/dL



RDW (Red Cell Distribution Width)

13.20 %



Platelets

114 x10³/uL



WBCS

The white cell differential shows which arm of the immune system is active: neutrophils (bacterial defense), lymphocytes (viral and adaptive immunity), monocytes (tissue repair and gut-wall immunity), eosinophils and basophils (allergy and parasites). Ratios between them are sensitive inflammation indices.

Neutrophils %

53.60 %



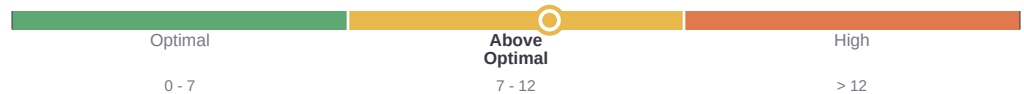
Lymphocytes %

34.60 %



Monocytes %

10.00 %



Eosinophils %

1.00 %



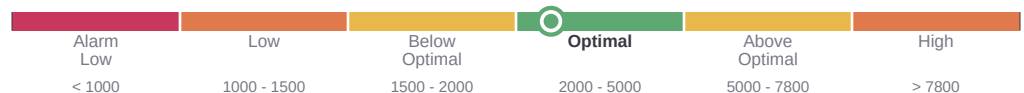
Basophils %

0.80 %



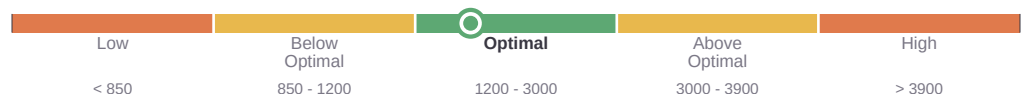
Neutrophils - Absolute

2626 cells/uL



Lymphocytes - Absolute

1695 cells/uL



Neutrophil : Lymphocyte Ratio

1.55 Ratio



Platelet : Lymphocyte Ratio

67.30 Ratio



Out of Optimal Range

The following pages list all biomarkers that fall outside their optimal range, grouped by direction of departure. Each marker is shown with its current value, units, and a brief explanation of what that pattern can mean and why it might be present.

Total number of biomarkers by status



Above Optimal / High

Hemoglobin A1C

5.40 %

HbA1c reflects average blood sugar over the past 8-12 weeks. Her 5.4% sits just above the Thriveology ceiling of 5.3% while fasting glucose (78) and fasting insulin (4.8) are both optimal. Two things explain this combination. First, meal pattern: skipping meals and eating most calories late in the day produces larger after-meal glucose peaks that the fasting numbers never see. Second, when active thyroid hormone (Free T3) runs low, red blood cells live slightly longer and carry more glucose, nudging A1c upward independent of actual blood sugar. Eating a protein-forward first meal earlier in the day addresses the first driver and, by signaling safety to the thyroid axis, helps the second.

Estimated Average Glucose (eAG)

108 mg/dL

eAG is calculated from the HbA1c ($28.7 \times \text{A1c} - 46.7$) and expresses the 8-12 week average blood glucose in glucose-meter units. At 108 mg/dL it mirrors the mildly elevated A1c and should be read with the same two caveats: late-day eating and a modest thyroid effect on red cell lifespan.

BUN

23 mg/dL

Blood Urea Nitrogen reflects how the kidneys clear nitrogen waste from protein metabolism. Her BUN of 23 mg/dL is at the upper edge of the lab range and above the functional optimal of 10-16, while creatinine is optimal. In a lean, active woman eating a protein-rich paleo pattern, practicing intermittent fasting, drinking coffee, and training 5-6 days a week, a high-normal BUN almost always means concentrated blood — too little water relative to protein load — rather than a kidney problem. Dehydration also raises the measured concentration of every protein and mineral on the panel, including globulin and calcium.

BUN : Creatinine Ratio**24.70** Ratio

The BUN to Creatinine ratio separates hydration and protein effects from true kidney effects. Her calculated ratio ($23 / 0.93 = 24.7$) exceeds the lab range of 6-22 because BUN is high with a normal creatinine — the signature of dehydration or a high dietary protein load, not of reduced filtration. Quest did not print the ratio because both inputs were individually within range; it is shown here because the relationship between them is the informative part.

Globulin - Total**3.10** g/dL

Globulins are the immune and transport proteins in blood. Her 3.1 g/dL is within the lab range but above the functional optimal of 2.4-2.8. Three contributors fit her picture: mild dehydration concentrates all proteins; two autoimmune conditions (Hashimoto's and ITP) keep immunoglobulin production somewhat active even when the thyroid antibodies themselves are quiet; and the gut — childhood antibiotic exposure, food intolerances, and a constipation tendency all point to low-grade intestinal immune activity, which the pending GI-MAP will clarify. With hs-CRP and ESR optimal, this is a pattern to track rather than a stand-alone concern.

Calcium**9.60** mg/dL

Blood calcium is tightly regulated by parathyroid hormone and vitamin D and reflects mineral handling more than dietary intake. Her 9.6 mg/dL is 0.1 above the functional ceiling and well within the lab range, so it does not indicate hypercalcemia. It matters because vitamin D is 196 ng/mL: very high vitamin D increases calcium absorption from the gut and release from bone, and the first sign of trouble is a rising calcium. An ionized calcium and PTH in 8-12 weeks, after vitamin D supplementation has been stopped, will confirm the system has settled.

Cholesterol - Total**264** mg/dL

Cholesterol is the raw material for every cell membrane, for estrogen, progesterone, testosterone, cortisol and vitamin D, and for bile. Her total of 264 mg/dL is flagged high by the lab and exceeds the 240 alarm threshold. The elevation is carried almost entirely by LDL (188) rather than HDL (57) and is confirmed by an elevated ApoB — a genuine increase in atherogenic particles. Three mechanisms converge in her case: a saturated-fat-rich, low-carbohydrate paleo pattern in a lean, active woman (the so-called lean-mass hyper-responder phenotype, marked by low triglycerides and healthy HDL alongside very high LDL); low active thyroid hormone, which reduces the liver's LDL receptor activity; and perimenopausal estrogen decline, which does the same. Each is addressable.

LDL Cholesterol**188** mg/dL

LDL is the main carrier of cholesterol to tissues, and its particle number — not its cholesterol content — drives artery risk. Her LDL-C of 188 mg/dL (Quest Martin-Hopkins calculation) is well above the lab's goal of below 100 and above the 160 alarm threshold. Because triglycerides are low and HDL healthy, this is a particle-number pattern, not a metabolic one. The liver clears LDL through receptors that are up-regulated by thyroid hormone and estrogen and down-regulated by dietary saturated fat; she has a shift in all three (Free T3 low-optimal on T4-only therapy, perimenopausal estradiol decline, and a paleo eating pattern). LDL-C of 190 or more is also the screening threshold for familial hypercholesterolemia, so a Lipoprotein(a) is worth adding before assuming the pattern is entirely lifestyle-driven.

Non-HDL Cholesterol**207** mg/dL

Non-HDL Cholesterol counts all atherogenic particles (LDL, VLDL, IDL) and predicts cardiovascular risk more strongly than LDL alone. Her 207 mg/dL is flagged high by the lab (goal below 130) and reinforces the LDL and ApoB findings. Because VLDL is low (16), essentially all of the excess is LDL — again pointing to reduced clearance rather than over-production.

Cholesterol : HDL Ratio**4.60** Ratio

The total cholesterol to HDL ratio is a strong cardiovascular risk indicator. Her 4.6 is inside the lab cutoff of 5.0 but above the functional optimal of 3.5. Since HDL is healthy, the ratio is elevated entirely by total cholesterol and will fall in step with LDL.

LDL : HDL Ratio**3.30** Ratio

The LDL to HDL ratio compares atherogenic to protective cholesterol. Quest classifies below 2.34 as below-average risk, 2.35-4.12 as average, 4.13-5.56 as moderate, and above 5.57 as high. Her 3.3 falls in the average-risk band — a reminder that her strong HDL is doing real protective work.

Apolipoprotein B**138** mg/dL

Apolipoprotein B is a direct count of atherogenic particles: every LDL, VLDL and IDL particle carries exactly one ApoB. Her 138 mg/dL is in Quest's High risk category (130 or greater; optimal below 90) and above the Thriveology alarm threshold. This is the single most important lipid number on the panel because it confirms that the high LDL-C reflects a high particle burden, and it is the number to follow on recheck: if ApoB falls below 100 after 12 weeks of thyroid optimization and dietary fat adjustment, the pattern was largely modifiable; if it does not, a genetic contribution becomes more likely and a broader conversation about options is appropriate.

Homocysteine**10.20** umol/L

Homocysteine is a by-product of methylation — the biochemical process that recycles neurotransmitters, detoxifies estrogen, and builds DNA — and it rises when vitamin B12, folate or B6 are insufficient. Her 10.2 umol/L is inside Quest's cutoff of 11.1 but well above the functional optimal of 7.0. Her RBC folate is adequate (595) and she does not drink alcohol, so the most likely cause is a functional B12 shortfall. Two features of her history make B12 malabsorption plausible: Hashimoto's clusters with autoimmune gastritis (which reduces the stomach acid and intrinsic factor needed to absorb B12), and a history of frequent antibiotics with ongoing gut symptoms. Elevated homocysteine is an independent vascular risk factor, impairs estrogen clearance, and is associated with anxiety and low mood — all relevant to Her. A serum B12 with methylmalonic acid (MMA) will confirm.

TSH**2.07** mIU/L

TSH is the pituitary's signal to the thyroid. She has Hashimoto's hypothyroidism and has taken levothyroxine 50 mcg daily for years. Her TSH of 2.07 is within the lab range and only marginally above the functional ceiling of 2.0, so on its own it is unremarkable — but on T4-only therapy TSH reflects how the pituitary sees T4, not how much active T3 the tissues are receiving. With Free T3 below optimal, Reverse T3 at the top of optimal, weight gain, fatigue and low mood, the dose and form of thyroid replacement are worth revisiting with her prescriber.

Sex Hormone Binding Globulin**115** nmol/L

SHBG binds estradiol and testosterone and keeps them inactive. Her 115 nmol/L is near the top of the lab range and well above the functional optimal of 30-90, which reduces the free, usable fraction of both hormones. Her history supplies the drivers: estradiol therapy (transdermal raises SHBG only modestly, but it contributes), and — more importantly — a low-insulin, calorie-restricted pattern: intermittent fasting, skipped meals and 5-6 training days a week in a lean woman. Insulin is the main suppressor of SHBG, and hers is 4.8. Notably, low SHBG is what insulin resistance produces, so this value also confirms that her lipid pattern is not metabolic. Eating regularly, especially earlier in the day, is the most direct way to bring SHBG down and free up testosterone.

Cortisol - AM (Serum)**15.20** mcg/dL

Morning serum cortisol captures the peak of the daily adrenal rhythm. Her 15.2 mcg/dL is within the lab range and only 0.2 above the functional ceiling — unremarkable alone. It is flagged because of its relationship to DHEA-S (65): cortisol favored over DHEA is the pattern of sustained stress load. Her sources are clear — hot flashes fragmenting sleep for a year, a demanding schedule with skipped meals, high training volume, and personal stress. Elevated evening cortisol (not measured here) is a common reason for difficulty falling asleep; a four-point salivary cortisol would map the daily curve if sleep does not improve.

Vitamin D, 25-Hydroxy (Total)**196** ng/mL

Vitamin D regulates calcium absorption, immune tolerance, mood and gene expression. Her 25-hydroxy vitamin D of 196 ng/mL is nearly double the top of the lab range (30-100) and above the 150 ng/mL level the Endocrine Society and Quest identify as the threshold for potential toxicity. The result is entirely D3 (D2 undetectable), so it is coming from supplementation. Her recorded intake of 5,000 IU daily would not ordinarily produce a level this high — a 50,000 IU product taken daily, a concentrated liquid, or a second source (multivitamin, fortified food) should be ruled out by checking labels. Calcium is not elevated (9.6), so there is no hypercalcemia today, but all vitamin D should be stopped now, with 25-OH D, calcium, ionized calcium and PTH rechecked in 8-12 weeks. Vitamin D is fat-soluble and has a half-life of weeks, so levels fall slowly. Symptoms of excess include nausea, constipation, thirst, frequent urination and fatigue — several of which overlap with her presenting complaints and should resolve as the level normalizes.

Omega-6 : Omega-3 Ratio**7.90** Ratio

The Omega-6 to Omega-3 ratio reflects the balance between pro- and anti-inflammatory fatty acid pathways in cell membranes. Quest's population range is 3.7-14.4; a functional target of about 4:1 or lower is widely used. Her 7.9 is better than the typical Western diet — consistent with her largely home-cooked, unprocessed eating — but above target, and the gap is on the omega-3 side of the ratio, not from excess omega-6.

Arachidonic Acid : EPA Ratio**24.20** Ratio

The Arachidonic Acid to EPA ratio is a sensitive index of cellular inflammatory tone; lower is better. Quest's population range is 3.7-40.7. Her 24.2 is above the functional target of 11 or below because EPA is low (0.5%), not because arachidonic acid is high (11.5%, mid-range). Raising EPA specifically — a higher-EPA fish oil — is the lever, within the dose limits appropriate for ITP.

MCV (Mean Cell Volume)**93.50** fL

MCV measures the average size of red blood cells. Her 93.5 fL is within the lab range but above the functional optimal of 85-92. Mildly enlarged red cells develop when the cell divides less often before release, which happens when vitamin B12 or folate is short or when thyroid hormone is low. With adequate RBC folate (595), elevated homocysteine (10.2), no alcohol intake, a Hashimoto's history (which clusters with the autoimmune gastritis that blocks B12 absorption) and a low-optimal Free T3, both B12 and thyroid are plausible contributors. B12 with methylmalonic acid will separate them.

RDW (Red Cell Distribution Width)**13.20** %

RDW measures variability in red cell size. Her 13.2% is within the lab range and marginally above the functional ceiling of 13.0. A slight rise in variability typically accompanies an early shift in MCV and supports the B12 pattern described above; it is not, on its own, a concern.

Monocytes %**10.00** %

Monocytes mature into macrophages that clear debris and pathogens and are the immune cells most active in tissue repair and in the gut wall. Her 10.0% (490 cells/uL absolute, within Quest's 200-950 range) is above the functional ceiling of 7%. In someone with two autoimmune conditions, a history of frequent antibiotics, multiple food intolerances and a constipation tendency, a relative monocytosis with a low-normal total WBC most often reflects ongoing low-grade gut-immune activity — the same signal seen in the mildly elevated globulin. The pending GI-MAP stool test is the right next step.

Below Optimal / Low

eGFR**78** mL/min/1.73m²

Estimated Glomerular Filtration Rate is the best single measure of kidney filtration. Her eGFR of 78 is within the lab's normal range (60 or greater) but below the functional optimal of 90-120 for her age. The estimate falls when blood is concentrated, so the same hydration pattern that raised BUN will have lowered eGFR. Two other reasons to recheck it well hydrated in 8-12 weeks: sustained very high vitamin D increases urinary calcium, which the kidneys must handle, and She has a history of frequent urinary tract infections. A urine albumin-to-creatinine ratio is a reasonable addition if eGFR does not recover.

Magnesium - RBC**5.80** mg/dL

Red Blood Cell Magnesium reflects intracellular stores and is more accurate than serum magnesium. Her 5.8 mg/dL is in the upper part of Quest's range but just below the Thriveology floor of 6.0 despite taking magnesium malate. Magnesium is consumed faster under sustained stress, intense training, and poor sleep — all present — and it is the cofactor for the enzymes that calm the nervous system (GABA signaling), relax muscle, and convert T4 to T3. For her goals, the glycinate form taken in the evening offers the same magnesium with a glycine component that supports sleep onset.

LDH**127** U/L

Lactate Dehydrogenase is an enzyme found in liver, heart, muscle and red blood cells that reflects general tissue turnover. Her 127 U/L is within the lab range and below the functional optimal of 140-200. Low LDH is not a disease marker; functionally it can accompany low-normal glucose utilization and reactive hypoglycemia tendencies, which fits a pattern of skipped meals and late-day hunger. It is worth tracking, not treating.

Free T3**2.90** pg/mL

Free T3 is the active thyroid hormone that sets metabolic rate, body temperature, energy, mood, bowel motility and the liver's LDL clearance. Her 2.9 pg/mL is inside the lab range but just below the functional floor of 3.0, while Total T4 and the Free Thyroxine Index are optimal — expected on levothyroxine, which supplies T4 only. The limiting step is conversion of T4 to T3, which the body deliberately slows when it senses energy scarcity: skipped meals, intermittent fasting, high training volume and poor sleep all do this, as does inflammation and low selenium or zinc. A low-optimal Free T3 is a plausible common thread behind her weight gain despite exercise, low energy, constipation tendency and elevated LDL.

DHEA-Sulfate (Female)**65** mcg/dL

DHEA-S is the most abundant adrenal steroid and the precursor to testosterone and, downstream, estrogen. Her 65 mcg/dL is within the lab range but below the functional optimal of 100-200. DHEA naturally declines through the 40s, and it falls faster under sustained stress, when the adrenal glands prioritize cortisol. Low DHEA-S limits testosterone production (libido, muscle, motivation) and weakens the buffering of cortisol's effects on sleep and mood. Any DHEA supplementation should be coordinated with her hormone prescriber, since DHEA converts to both androgens and estrogens.

Free T3 : Reverse T3 Ratio**1.93** Ratio

The Free T3 to Reverse T3 ratio measures how much T4 is being converted to active hormone versus shunted to the inactive form. Her 1.93 is just below the functional target of 2.0 or greater: Free T3 is at the low end and Reverse T3 at the upper edge of optimal (15). This is the classic signature of a body conserving energy — under-eating relative to training load and sleep debt — and it means that simply raising the levothyroxine dose may not translate into more active hormone unless the conversion environment (calories, meal timing, recovery, selenium, zinc) improves too.

OmegaCheck (EPA+DPA+DHA)**4.40** % by wt

OmegaCheck measures the long-chain omega-3 fatty acids (EPA, DPA, DHA) as a percentage of total fatty acids in whole blood. Quest classifies 5.5% or greater as optimal, 3.8-5.4% as moderate risk, and 3.7% or below as high risk for sudden cardiac death. Her 4.4% is in the moderate-risk band despite taking an omega-3 supplement, which points to dose, product quality (oxidized or low-EPA products), or absorption — her bloating and fat-digestion complaints make the last worth considering. Omega-3s lower vascular inflammation, support mood and hot-flash tolerance, and reduce platelet stickiness; because she has ITP, total EPA+DHA should stay at or below 2-3 g/day and be cleared with her hematologist.

Testosterone - Total (Female, LC/MS/MS)**18** ng/dL

Testosterone in women drives libido, motivation, muscle and tendon repair, bone density and mood. Her total of 18 ng/dL is within Quest's range for adult women but below the functional optimal of 30-45, and libido is her leading concern. Two things reduce it: production (DHEA-S, the adrenal precursor, is low-optimal at 65) and availability (SHBG of 115 binds most of what is made). Testosterone also supports connective-tissue repair, which is relevant to her recurrent knee and hip bursitis.

DPA (Docosapentaenoic Acid)**0.70** % by wt

DPA is an intermediate omega-3 between EPA and DHA. Her 0.7% is flagged low by the lab (0.8-1.8) and is the clearest single signal that her current omega-3 intake is not reaching her cells.

White Blood Cell Count (WBC)**4.90** $\times 10^3/\mu\text{L}$

Total WBC count measures overall immune activity. Her 4.9 is within the lab range and 0.1 below the functional floor of 5.0 — a marginal finding. A low-normal count is common in autoimmune conditions such as ITP and Hashimoto's, where the immune system is chronically engaged, and in sustained stress, where cortisol suppresses white cell release. It is worth tracking alongside the platelet count.

Platelets**114** $\times 10^3/\mu\text{L}$

Platelets are essential for clotting. Her count of 114 $\times 10^3/\mu\text{L}$ is below the lab range (140-400), a mild thrombocytopenia that is consistent with her known diagnosis of idiopathic thrombocytopenic purpura (ITP), an autoimmune condition in which antibodies shorten platelet survival. The lab could not report Mean Platelet Volume because of variability in platelet size — expected in ITP, where the marrow releases larger, younger platelets to compensate. Clinically, 114 is well above the levels at which bleeding risk rises (below 50) and every other cell line is normal, so this is a monitoring finding, not an urgent one. Factors within her control that support platelet counts: correcting B12 insufficiency (B12 deficiency independently lowers platelets), keeping omega-3 intake at or below 2-3 g/day, avoiding NSAIDs, and — because ITP is autoimmune — the same gut and immune work that supports her Hashimoto's. A repeat CBC with a peripheral smear on her hematologist's schedule is appropriate.

Platelet : Lymphocyte Ratio**67.30** Ratio

The Platelet to Lymphocyte ratio is an inflammatory index; elevated values are associated with cardiovascular risk. Her 67.3 is slightly below the functional floor of 70 solely because her platelet count is low from ITP — it is not an inflammatory signal and carries no independent meaning here.

Functional body system analysis, accessory systems, and nutrient status.

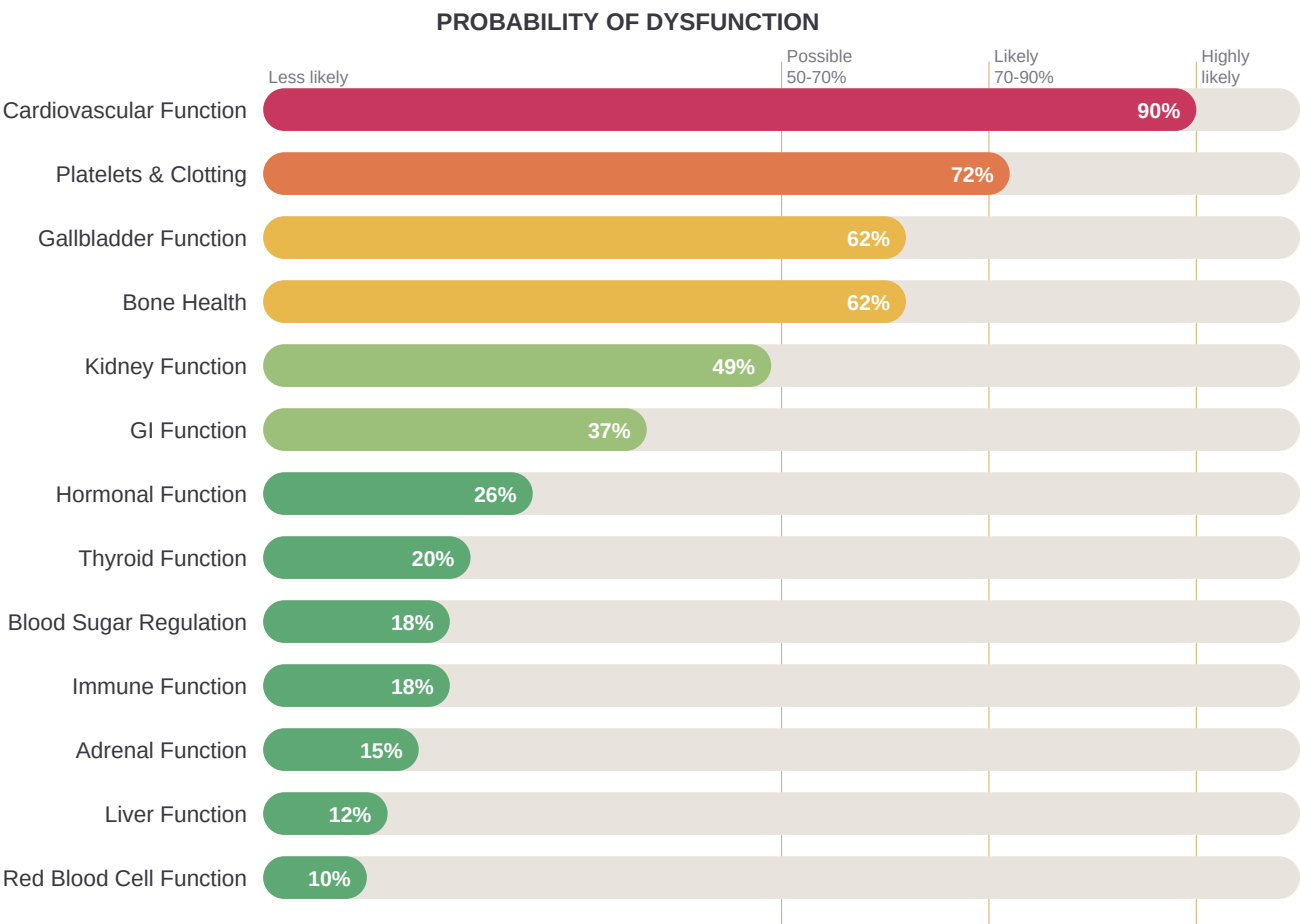
Assessment

- 25 Functional Body Systems
- 28 Accessory Systems
- 29 Nutrient Status

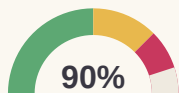
3

Functional Body Systems

This report represents an algorithmic assessment of how each major body system is currently functioning, calculated from the patterns across the biomarkers that contribute to that system. Higher percentages indicate a higher likelihood of dysfunction worth investigating.



Body Systems Needing Attention



90%

Highly likely
improvement is
needed

CARDIOVASCULAR FUNCTION

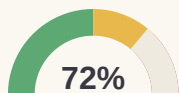
Markers contributing to Cardiovascular Function show a pattern that warrants attention. Total cholesterol (264), LDL (188), Non-HDL (207) and Apolipoprotein B (138) are all elevated, with ApoB in the lab's high-risk band. Triglycerides, the Trig:HDL ratio, fasting insulin and hs-CRP are optimal, so this is a particle-clearance pattern, not a metabolic one — driven by a saturated-fat-rich paleo diet in a lean, active woman, low-optimal Free T3 on T4-only thyroid therapy, and perimenopausal estrogen decline. Homocysteine (10.2) and a moderate-risk omega-3 index add risk; healthy HDL (57) and low inflammation are protective. Lipoprotein(a) should be checked.

Rationale

Cholesterol - Total ↑, LDL Cholesterol ↑, Non-HDL Cholesterol ↑, Apolipoprotein B ↑, LDL : HDL Ratio ↑, Homocysteine ↑, Cholesterol : HDL Ratio ↑, OmegaCheck (EPA+DPA+DHA) ↓

Biomarkers Considered

Cholesterol - Total, LDL Cholesterol, HDL Cholesterol, Non-HDL Cholesterol, Triglycerides, Apolipoprotein B, LDL : HDL Ratio, hs-CRP (Cardiac), Homocysteine, Triglycerides : HDL Ratio, Cholesterol : HDL Ratio, OmegaCheck (EPA+DPA+DHA)



72%

Likely improvement
is needed

PLATELETS & CLOTTING

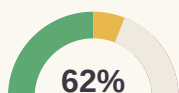
Markers contributing to Platelets & Clotting show a pattern that warrants attention. Platelets are 114, below the lab range — consistent with her known ITP, an autoimmune condition that shortens platelet survival. The unreportable platelet volume fits ITP (larger, younger platelets). The count is mild, well above bleeding-risk levels, and every other cell line is normal. This is a monitoring finding; B12 repletion, omega-3 kept at or below 2-3 g/day, and hematology follow-up are the supports.

Rationale

Platelets ↓, Platelet : Lymphocyte Ratio ↓

Biomarkers Considered

Platelets, Platelet : Lymphocyte Ratio



62%

Dysfunction Possible
There may be
improvement
needed in certain
areas

GALLBLADDER FUNCTION

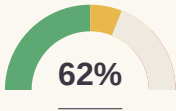
Markers contributing to Gallbladder Function show a borderline pattern that we will want to monitor. This flag is driven by the elevated total cholesterol; the only other shifted marker, LDH (127), is marginally below optimal, which is not a bile-flow signal. The bile-flow markers themselves — alkaline phosphatase, GGT, direct and total bilirubin — are all optimal, so there is no evidence of impaired bile flow; cholesterol is addressed under Cardiovascular Function.

Rationale

LDH ↓, Cholesterol - Total ↑

Biomarkers Considered

Alkaline Phosphatase, GGT, Bilirubin - Total, Bilirubin - Direct, LDH, Cholesterol - Total, Triglycerides



Dysfunction Possible
There may be
improvement
needed in certain
areas

BONE HEALTH

Markers contributing to Bone Health show a borderline pattern that we will want to monitor. This flag reflects vitamin D excess (196 ng/mL), not deficiency. Calcium is at the upper edge of optimal (9.6), RBC magnesium is just under target, and alkaline phosphatase and protein status are optimal. Sustained very high vitamin D can mobilize calcium from bone — at a life stage when lower estradiol and androgens already challenge bone — so stopping supplementation and rechecking calcium/PTH matters. Strength training 5-6 days a week is a strong protective factor; a baseline DEXA is reasonable.

Rationale

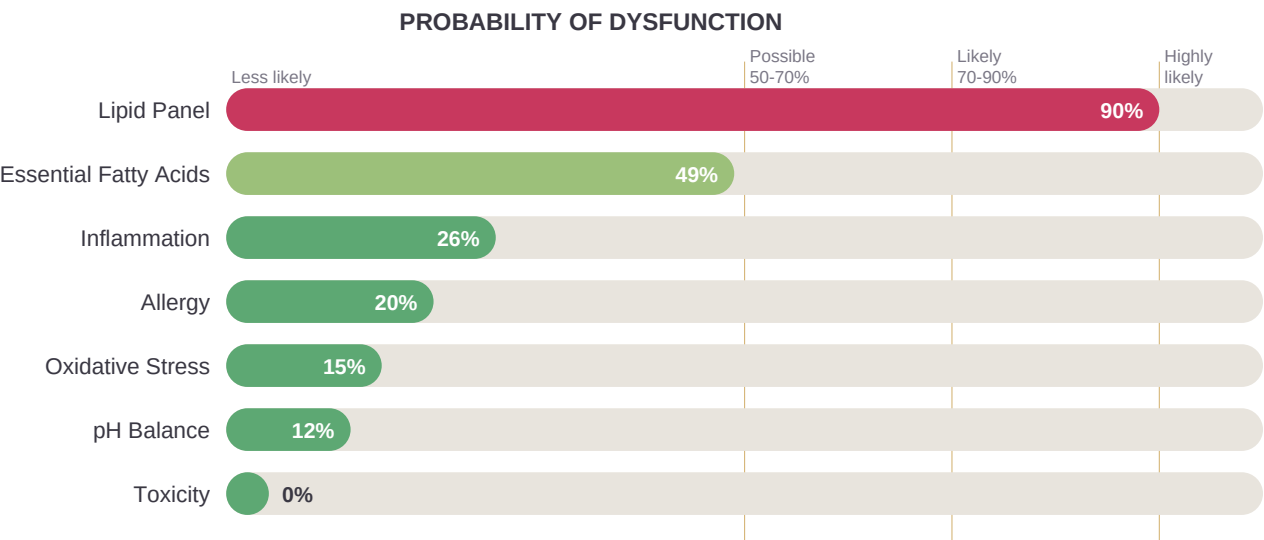
Calcium ↑, Vitamin D, 25-Hydroxy (Total) ↑,
Magnesium - RBC ↓

Biomarkers Considered

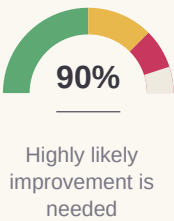
Calcium, Alkaline Phosphatase, Vitamin D,
25-Hydroxy (Total), Magnesium - RBC, Protein
- Total, Albumin

Accessory Systems

Accessory systems are physiological processes that cut across multiple organs — inflammation, oxidative stress, pH balance, toxic load, allergic tendency, the lipid panel as a whole, and essential fatty acid balance. They give important context to the body system findings.



Accessory Systems Needing Attention



LIPID PANEL

Markers contributing to Lipid Panel show a pattern that warrants attention. Total cholesterol, LDL, Non-HDL and ApoB are elevated (ApoB 138 in the lab's high-risk band) while triglycerides and HDL are optimal — an LDL-particle-driven pattern that warrants Lipoprotein(a) testing and dietary/therapeutic follow-up.

Rationale

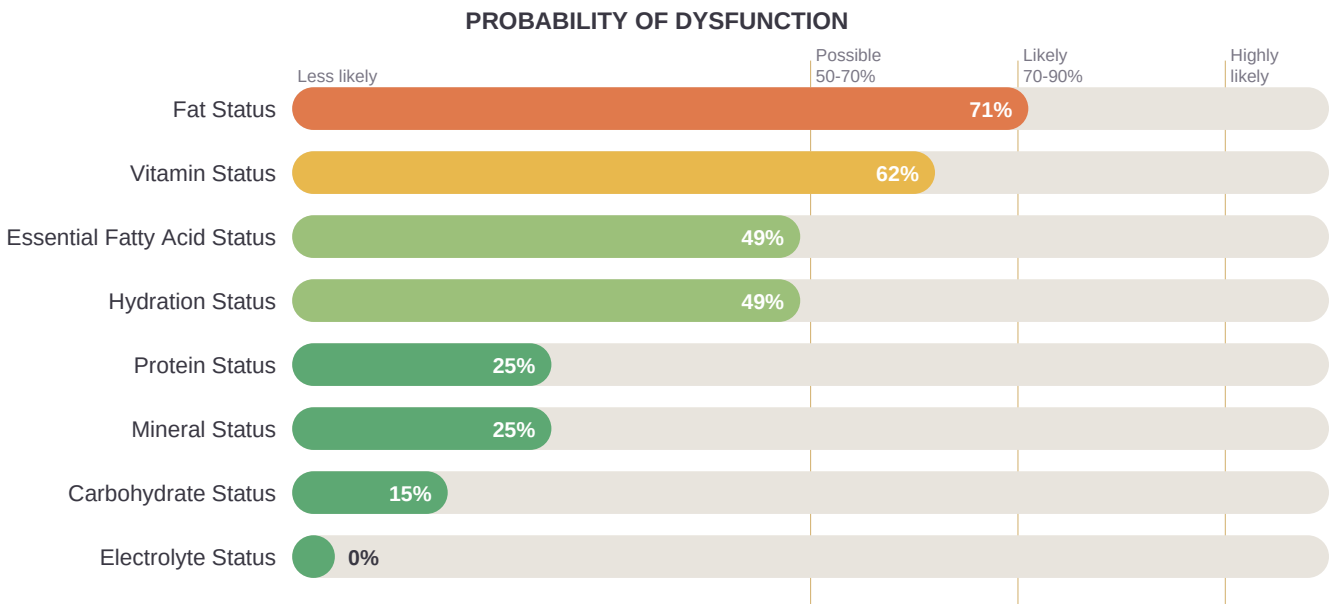
Cholesterol - Total ↑, LDL Cholesterol ↑, Non-HDL Cholesterol ↑, Apolipoprotein B ↑, LDL : HDL Ratio ↑

Biomarkers Considered

Cholesterol - Total, LDL Cholesterol, HDL Cholesterol, Triglycerides, Non-HDL Cholesterol, Apolipoprotein B, LDL : HDL Ratio

Nutrient Status

Nutrient status reflects the indirect signals on your blood test that suggest your body’s overall nutritional sufficiency. Each category is influenced by dietary intake, digestion, absorption, and cellular uptake.



Nutrient Categories Needing Attention

Likely improvement is needed

FAT STATUS

Markers contributing to Fat Status show a pattern that warrants attention. Cholesterol and LDL are markedly elevated while triglycerides and HDL are optimal, and the omega-3 index is in the moderate-risk range despite supplementation — the type and balance of dietary fat, more than the amount, is the focus.

Rationale

Cholesterol - Total ↑, LDL Cholesterol ↑, OmegaCheck (EPA+DPA+DHA) ↓

Biomarkers Considered

Cholesterol - Total, Triglycerides, LDL Cholesterol, HDL Cholesterol, OmegaCheck (EPA+DPA+DHA)

Dysfunction Possible
There may be improvement needed in certain areas

VITAMIN STATUS

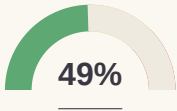
Markers contributing to Vitamin Status show a borderline pattern that we will want to monitor. Vitamin D is far above range (196 ng/mL — excess from supplementation, not deficiency). RBC folate is adequate, but homocysteine (10.2), MCV and RDW together point to vitamin B12 insufficiency, most likely from absorption.

Rationale

Vitamin D, 25-Hydroxy (Total) ↑, Homocysteine ↑, MCV (Mean Cell Volume) ↑, RDW (Red Cell Distribution Width) ↑

Biomarkers Considered

Vitamin D, 25-Hydroxy (Total), Homocysteine, MCV (Mean Cell Volume), RDW (Red Cell Distribution Width), Alkaline Phosphatase, Folate - RBC



Less likely Function
looks healthy

ESSENTIAL FATTY ACID STATUS

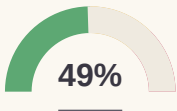
Markers contributing to Essential Fatty Acid Status show a borderline pattern that we will want to monitor. Long-chain omega-3 levels (OmegaCheck 4.4%, DPA below range, EPA low-normal) are insufficient relative to omega-6 intake.

Rationale

OmegaCheck (EPA+DPA+DHA) ↓, DPA (Docosapentaenoic Acid) ↓, Omega-6 : Omega-3 Ratio ↑

Biomarkers Considered

OmegaCheck (EPA+DPA+DHA), EPA (Eicosapentaenoic Acid), DPA (Docosapentaenoic Acid), DHA (Docosahexaenoic Acid), Omega-6 : Omega-3 Ratio



Less likely Function
looks healthy

HYDRATION STATUS

Markers contributing to Hydration Status show a borderline pattern that we will want to monitor. Sodium, chloride and albumin are optimal, but the calculated BUN:Creatinine ratio (24.7) is above range — the classic signature of under-hydration at a fasting draw, in a coffee-drinking, intermittently fasting, highly active woman.

Rationale

BUN : Creatinine Ratio ↑

Biomarkers Considered

Sodium, Chloride, BUN : Creatinine Ratio, Albumin

How the findings connect, and the areas that most need support, with the rationale for each.

Health Concerns

- 32 How the Findings Connect
- 34 Health Concerns Report



How the Findings Connect

Functional medicine reads a blood panel as a system, not a list. A marker that is only slightly off rarely matters on its own — but several slightly-off markers along the same pathway can compound into a symptom somewhere else in the body. The five pathways below link her results to the concerns she brought to her visit: sleep, energy, weight, libido, mood and hot flashes.

1. Perimenopause → Sleep → Stress Hormones → Libido & Mood

Hot flashes → fragmented sleep → cortisol 15.2 / DHEA-S 65 → testosterone 18 with SHBG 115 → libido, motivation, anxiety

A year of hot flashes has fragmented sleep, and poor sleep keeps cortisol elevated. Under sustained load the adrenal glands favor cortisol over DHEA, so DHEA-S — the precursor to testosterone — has drifted below optimal. What testosterone is made is then largely bound by a high SHBG. The downstream result is low free androgen: reduced libido and motivation, slower muscle and tendon repair (recurrent bursitis), and a thinner buffer against anxiety. Progesterone, whose metabolite calms the nervous system through GABA, is being applied topically but does not register in serum, so symptoms (slow sleep onset, anxiety) are the guide — and they suggest it is not yet sufficient. Estradiol at 53 pg/mL is absorbed but at the low end for symptom control.

2. Meal Timing & Training → Thyroid Conversion → Metabolism, Mood & Cholesterol

Skipped meals + fasting + 5-6 training days → T4→T3 conversion slows (Free T3 2.9, Reverse T3 15) → metabolic rate, energy, mood, bowel motility → LDL clearance

Her levothyroxine supplies T4 only; the body must convert it to active T3, and it deliberately slows that conversion when it senses energy scarcity. Skipping meals, intermittent fasting, heavy training and sleep debt all send that signal — and cortisol amplifies it. A low-optimal Free T3 slows metabolic rate (weight gain despite exercise), lowers energy and mood, slows the bowel, and reduces the liver's LDL-receptor activity, so cholesterol rises. Regular, adequate meals are the most direct lever on this pathway; selenium and zinc support the converting enzymes; a prescriber review of dose or the addition of T3 is the medical option.

3. Dietary Fat Pattern + Estrogen Decline + Low T3 → LDL Particle Burden

Saturated-fat-rich paleo pattern in a lean, active woman + declining estradiol + low Free T3 → reduced LDL clearance → LDL 188, ApoB 138, Non-HDL 207

Three independent brakes on LDL clearance are all partly released at once. Dietary saturated fat down-regulates the liver's LDL receptors; estrogen and thyroid hormone up-regulate them, and both are lower than ideal. The result is the 'lean-mass hyper-responder' profile: excellent triglycerides (80), healthy HDL (57), optimal insulin — and a high LDL particle count confirmed by ApoB. Homocysteine (10.2) and a moderate-risk omega-3 index (4.4) add vascular risk through inflammation and endothelial function; hs-CRP of 0.7 is a genuine protective factor. Because LDL is near 190, Lipoprotein(a) should be measured to rule out a genetic contribution before attributing the whole pattern to modifiable causes.

4. Hashimoto's → Gut & Absorption → B12 → Homocysteine, Mood & Platelets

Autoimmune thyroiditis + childhood antibiotics + food intolerances + constipation → reduced B12 absorption (MCV 93.5, homocysteine 10.2, folate adequate) → methylation, mood, estrogen clearance, platelet production

Hashimoto's and ITP share an autoimmune root, and Hashimoto's clusters with autoimmune gastritis, which reduces the stomach acid and intrinsic factor that B12 absorption requires. Add years of antibiotics, bloating with multiple foods and a constipation tendency, and the gut becomes the likely reason a B12-rich diet is not translating into B12 sufficiency. Low B12 raises homocysteine (vascular and neurological risk), slows methylation (neurotransmitter synthesis and estrogen clearance — relevant to mood and to hormone therapy), and can lower platelet counts. The relative monocytosis (10%) and mildly elevated globulin (3.1) are the immune system's quiet signal of gut-wall activity; the pending GI-MAP will clarify it.

5. Vitamin D Excess → Calcium Handling → Kidneys & Bone

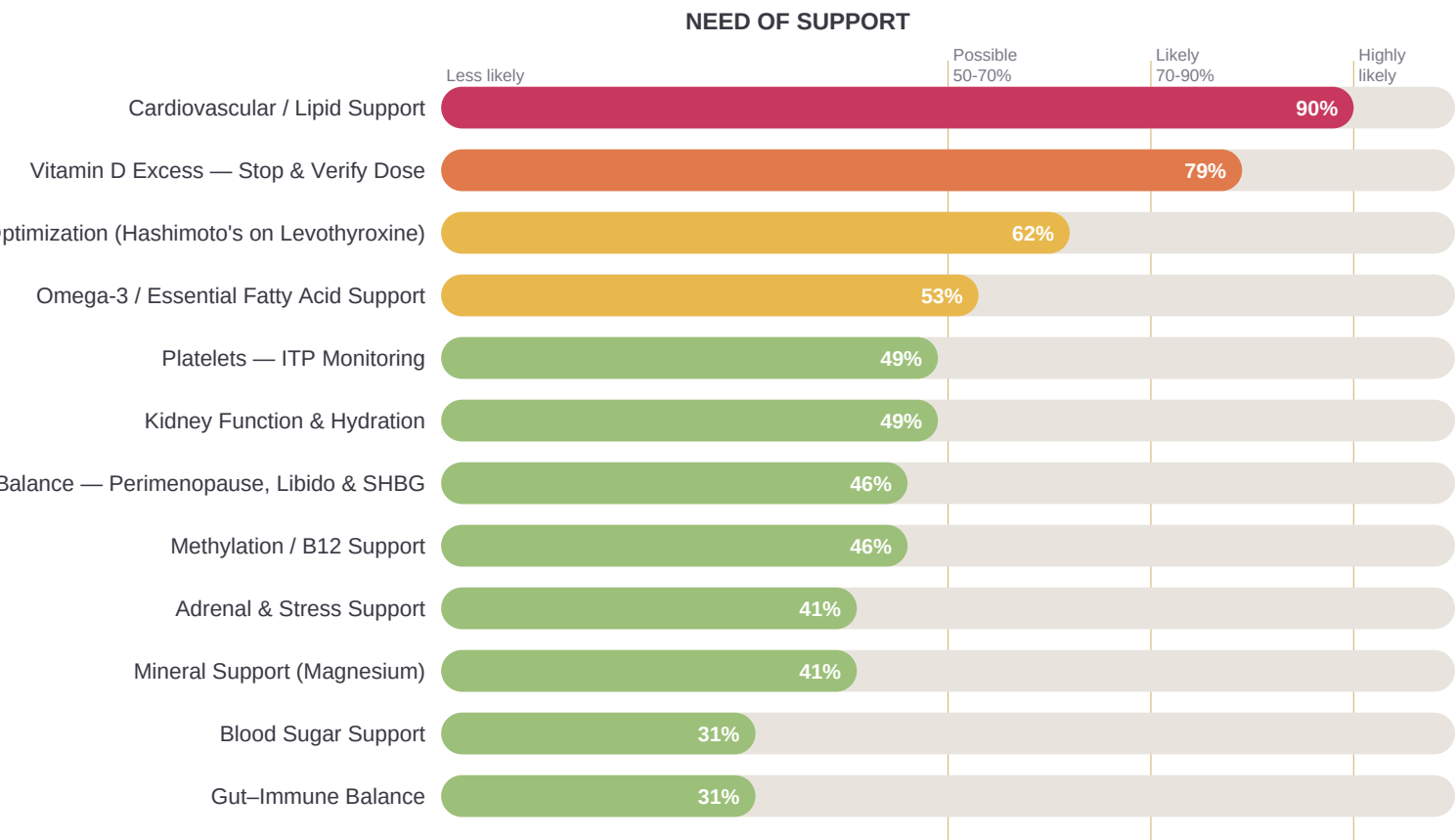
Vitamin D 196 ng/mL → calcium 9.6 (upper optimal) → urinary calcium load on concentrated kidneys (BUN 23, eGFR 78) → recheck calcium, PTH, kidney function

Very high vitamin D increases calcium absorption from the gut and release from bone. Calcium is still normal, but the kidneys must excrete the extra, and her BUN and eGFR show they were working with too little water. Sustained excess can, paradoxically, mobilize calcium from bone at exactly the life stage — perimenopause, with lower estradiol and androgens — when bone is most vulnerable. Stopping vitamin D, hydrating, and rechecking calcium, ionized calcium, PTH and eGFR in 8-12 weeks closes this loop; a baseline DEXA scan is reasonable given her hormonal transition.

Read together, these pathways say something hopeful: most of the shifts on this panel are the body's adaptive response to a year of poor sleep and under-fueling during a hormonal transition — not independent problems. Restoring the signal of safety (regular meals, hydration, recovery, adequate progesterone and estradiol support) is expected to move several markers at once.

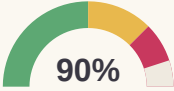
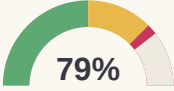
Health Concerns Report

This summary brings together every finding in the report and ranks the areas that most deserve focused support. Each concern includes a brief explanation, the contributing markers, and the direction in which they are shifted.



Health Concerns Details

Each concern below includes an explanation of the result and the rationale behind the interpretation.

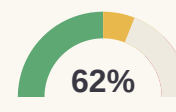
CARDIOVASCULAR / LIPID SUPPORT Total Cholesterol 264, LDL-C 188, Non-HDL 207 and — most importantly — Apolipoprotein B 138 mg/dL (Quest's High risk band) describe a clear atherogenic particle burden. The pattern is not metabolic: triglycerides (80), fasting insulin (4.8), the Trig:HDL ratio (1.40) and SHBG (high, not low) all rule out insulin resistance. Three converging mechanisms fit her history instead. (1) Diet: a saturated-fat-rich, low-carbohydrate paleo pattern in a lean, highly active woman produces the 'lean-mass hyper-responder' lipid profile — low triglycerides, healthy HDL, very high LDL. (2) Thyroid: Free T3 is low-optimal on T4-only therapy, and active thyroid hormone is what drives the liver's LDL receptors; hypothyroidism is a guideline-recognized secondary cause of high cholesterol. (3) Perimenopause: declining estradiol does the same. Homocysteine (10.2) and a moderate-risk omega-3 index add independent, modifiable vascular risk; hs-CRP 0.7 and HDL 57 are genuine protective factors. Plan: add Lipoprotein(a) and an NMR particle count now (LDL near 190 warrants screening for familial hypercholesterolemia); within her paleo pattern, shift from butter, coconut oil and fatty red meat toward olive oil, avocado, fish and nuts, and add soluble fiber (chia, flax, berries, squash); optimize thyroid conversion; recheck ApoB in 12 weeks. If ApoB remains above 100, a conversation about further options is appropriate. Rationale: Cholesterol - Total ↑, LDL Cholesterol ↑, Non-HDL Cholesterol ↑, Apolipoprotein B ↑, LDL : HDL Ratio ↑, Cholesterol : HDL Ratio ↑, Homocysteine ↑, OmegaCheck (EPA+DPA+DHA) ↓	 90% Highly likely improvement is needed
VITAMIN D EXCESS — STOP & VERIFY DOSE Her 25-hydroxy vitamin D is 196 ng/mL — nearly double the top of the lab range (30-100) and above the 150 ng/mL level at which toxicity becomes a concern. It is entirely D3, so it is coming from supplementation; the recorded intake of 5,000 IU daily would not normally produce this level, so the product label (some contain 50,000 IU per dose), the dropper concentration, and any second source (multivitamin, fortified foods) should be checked. Calcium is 9.6 mg/dL — not elevated — so there is no hypercalcemia today. Action: stop all vitamin D now; recheck 25-OH D, calcium, ionized calcium and PTH in 8-12 weeks (vitamin D clears slowly); hydrate well, since high vitamin D raises urinary calcium and her BUN and eGFR already suggest concentrated blood. Nausea, constipation, thirst, frequent urination and fatigue are symptoms of excess — some overlap with her current complaints and should ease as the level falls. Once normal, a maintenance dose targeting 50-80 ng/mL can be resumed. Rationale: Vitamin D, 25-Hydroxy (Total) ↑, Calcium ↑	 79% Likely improvement is needed

THYROID OPTIMIZATION (HASHIMOTO'S ON LEVOTHYROXINE)

She has Hashimoto's hypothyroidism and has taken levothyroxine 50 mcg for years. The good news first: both thyroid antibodies are now undetectable, and Total T4 (9.0) and the Free Thyroxine Index (2.5) are optimal — the T4 supply is adequate. The gap is conversion: Free T3 (2.9) is below the functional floor, Reverse T3 (15) sits at the top of optimal, the Free T3:Reverse T3 ratio (1.93) is under target, and TSH (2.07) is marginally above optimal. On T4-only therapy this is the signature of a body slowing T4-to-T3 conversion — which it does under energy scarcity: skipped meals, intermittent fasting, 5-6 training days a week, and a year of broken sleep. Low active thyroid hormone is a plausible common thread behind her weight gain despite exercise, low energy, mood changes, constipation tendency and elevated LDL, which is why LDL is listed in this concern's rationale. Plan: restore regular, adequate meals (especially a protein-forward first meal); support conversion with selenium (200 mcg), zinc and adequate iron (already optimal); reduce cortisol load; and discuss with her prescriber whether a dose adjustment or the addition of T3 is warranted, given a TSH above 2 with a low Free T3 on 50 mcg. Recheck TSH, Free T4, Free T3 and Reverse T3 in 8-12 weeks.

Rationale:

Free T3 ↓, Free T3 : Reverse T3 Ratio ↓, TSH ↑, LDL Cholesterol ↑



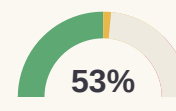
Improvement possible

OMEGA-3 / ESSENTIAL FATTY ACID SUPPORT

OmegaCheck 4.4% is in Quest's moderate-risk band (optimal 5.5% or greater), DPA is below the lab range, EPA is in the lowest quarter of its range, and the AA:EPA ratio (24.2) reflects that shortfall — all despite her already taking an omega-3 supplement. That points to dose (many products deliver under 500 mg EPA+DHA per serving), quality (oxidized or low-EPA oils), or absorption (bloating and food intolerances suggest fat digestion is worth assessing; the GI-MAP will help). Omega-3 status is one of the most modifiable vascular inputs on this panel and also supports mood, joint recovery and hot-flash tolerance. Plan: a third-party-tested, EPA-forward fish oil providing about 2 g EPA+DHA daily with a fat-containing meal, plus two servings of fatty fish weekly. Because she has ITP, total EPA+DHA should stay at or below 2-3 g/day and be cleared with her hematologist. Recheck in 4 months.

Rationale:

OmegaCheck (EPA+DPA+DHA) ↓, DPA (Docosapentaenoic Acid) ↓, Arachidonic Acid : EPA Ratio ↑, Omega-6 : Omega-3 Ratio ↑



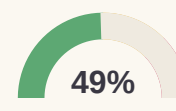
Improvement possible

PLATELETS — ITP MONITORING

Platelets are $114 \times 10^3/\mu\text{L}$, below the lab range (140-400) and consistent with her known idiopathic thrombocytopenic purpura, an autoimmune condition in which antibodies shorten platelet lifespan. The unreportable Mean Platelet Volume fits ITP, in which the marrow releases larger, younger platelets. This is a mild count — well above the level at which bleeding risk rises (below 50) — and hemoglobin (14.5), red cells and white cells are all normal, so it is a monitoring finding, not an urgent one. Supports within her control: correct the B12 insufficiency (B12 deficiency independently lowers platelets); keep omega-3 at or below 2-3 g/day; avoid NSAIDs and high-dose fish oil, turmeric or ginkgo without hematology input; and pursue the same gut-immune work that supports her Hashimoto's, since ITP and Hashimoto's share an autoimmune root. Repeat CBC with peripheral smear on her hematologist's schedule.

Rationale:

Platelets ↓, Platelet : Lymphocyte Ratio ↓, White Blood Cell Count (WBC) ↓



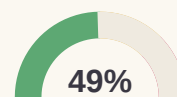
Mild pattern worth tracking

KIDNEY FUNCTION & HYDRATION

BUN of 23 mg/dL is at the upper end of the lab range, the calculated BUN:Creatinine ratio (24.7) exceeds the lab range, and eGFR of 78 is below the functional optimal of 90 — while creatinine (0.93) and uric acid (3.8) are optimal. In a lean, active woman eating a protein-rich paleo diet, fasting until later in the day, drinking coffee and training 5-6 days a week, this is the profile of concentrated blood, not of kidney disease. It matters more than usual for her because very high vitamin D increases urinary calcium, which well-hydrated kidneys handle easily and under-hydrated kidneys do not, and because she has a history of urinary tract infections. Plan: 2.5-3 liters of water daily with electrolytes on training days; repeat the metabolic panel well hydrated in 8-12 weeks alongside the vitamin D recheck; add a urine albumin-to-creatinine ratio if eGFR has not recovered.

Rationale:

BUN ↑, BUN : Creatinine Ratio ↑, eGFR ↓



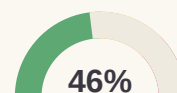
Mild pattern worth tracking

HORMONE BALANCE — PERIMENOPAUSE, LIBIDO & SHBG

Her leading concerns — libido, sleep, weight, energy, mood and hot flashes — sit in this system. Estradiol on transdermal therapy is 53 pg/mL: absorbed, but at the low end of what controls hot flashes, so persistent symptoms warrant a dose review with her OBGYN. Serum progesterone (<0.5) cannot judge her topical progesterone, because transdermal progesterone does not register in serum; her difficulty falling asleep and anxiety are the better guide and suggest progesterone support is insufficient — oral micronized progesterone at bedtime is one option to discuss. SHBG is 115 (optimal 30-90), binding most of the testosterone she makes; it is driven by estradiol therapy and, more so, by a low-insulin, calorie-restricted pattern (intermittent fasting, skipped meals, heavy training). Total testosterone (18) and DHEA-S (65) are both below optimal, so production is also limited. The result is little usable testosterone — the hormone of libido, motivation, muscle and tendon repair. Plan: regular meals to lower SHBG; stress and sleep work to spare DHEA; consider low-dose DHEA in coordination with her prescriber; recheck the hormone panel in 12 weeks after the estradiol/progesterone review.

Rationale:

Sex Hormone Binding Globulin ↑, Testosterone - Total (Female, LC/MS/MS) ↓, DHEA-Sulfate (Female) ↓



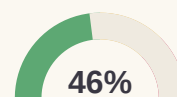
Mild pattern worth tracking

METHYLATION / B12 SUPPORT

Homocysteine of 10.2 umol/L (optimal 7.0 or below) with a mildly elevated MCV (93.5), an RDW of 13.2% and an adequate RBC folate (595) is the signature of functional vitamin B12 insufficiency rather than folate deficiency — and she does not drink alcohol, which removes the other common cause of a rising MCV. Her diet contains B12 (meat, eggs, fish), so absorption is the question: Hashimoto's clusters with autoimmune gastritis, which reduces the stomach acid and intrinsic factor B12 absorption depends on, and years of antibiotics plus ongoing gut symptoms point the same way. B12 and methylation matter beyond the heart: they support neurotransmitter synthesis (mood, anxiety), estrogen clearance (relevant on hormone therapy), red cell and platelet production (relevant to ITP), and energy. Plan: serum B12 with methylmalonic acid (MMA), and consider parietal-cell and intrinsic-factor antibodies given the Hashimoto's history; begin methylcobalamin or hydroxocobalamin (sublingual 1,000 mcg daily, or injections if absorption is confirmed poor) with a methylated B-complex; recheck homocysteine in 3-4 months.

Rationale:

Homocysteine ↑, MCV (Mean Cell Volume) ↑, RDW (Red Cell Distribution Width) ↑



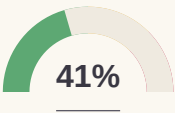
Mild pattern worth tracking

ADRENAL & STRESS SUPPORT

Morning cortisol (15.2) is marginally above the functional ceiling while DHEA-S (65) is below its floor — the cortisol-over-DHEA relationship the adrenal glands produce under sustained load. Her sources are identifiable: a year of hot flashes fragmenting sleep, a demanding schedule with skipped meals, 5-6 training days a week with limited recovery, and personal stress. The sodium:potassium ratio (32.3) is optimal, which is reassuring for aldosterone balance. This pattern feeds several of her other findings: cortisol slows T4-to-T3 conversion, suppresses DHEA and testosterone, disrupts sleep onset, and encourages central fat gain. Plan: a consistent sleep window; a protein-forward breakfast; replace one or two high-intensity sessions per week with walking, mobility or yoga while recovering; magnesium glycinate and, if sleep does not improve, a four-point salivary cortisol to map the evening curve; adaptogens (ashwagandha, rhodiola) can be layered in under supervision.

Rationale:

DHEA-Sulfate (Female) ↓, Cortisol - AM (Serum) ↑



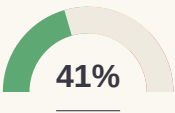
Mild pattern worth tracking

MINERAL SUPPORT (MAGNESIUM)

RBC magnesium of 5.8 mg/dL is just below the Thriveology floor of 6.0 despite her taking magnesium malate. Magnesium is depleted faster by stress, sweat, poor sleep and caffeine — all present — and it is the cofactor for GABA signaling (sleep, anxiety), muscle relaxation (bursitis, recovery) and thyroid hormone conversion. Plan: switch to or add magnesium glycinate 300-400 mg in the evening, which pairs magnesium with sleep-supportive glycine; keep leafy greens, pumpkin seeds and nuts in the diet. Calcium (9.6) is marginally above optimal and is being tracked as part of the vitamin D follow-up.

Rationale:

Magnesium - RBC ↓, Calcium ↑



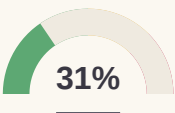
Mild pattern worth tracking

BLOOD SUGAR SUPPORT

Fasting glucose (78) and fasting insulin (4.8) are both optimal, yet HbA1c is 5.4% (functional ceiling 5.3%; eAG 108). Two explanations fit her: skipping meals and eating most of the day's food late produces larger after-meal glucose peaks that fasting tests miss; and low-optimal Free T3 modestly lengthens red cell lifespan, which raises A1c independent of glucose. Plan: shift intake earlier with a protein-forward first meal, pair carbohydrates with protein and fat, and take a 10-15 minute walk after the largest meal; a two-week continuous glucose monitor would show exactly which meals drive the peaks. Recheck A1c in 3 months alongside thyroid.

Rationale:

Hemoglobin A1C ↑, Estimated Average Glucose (eAG) ↑



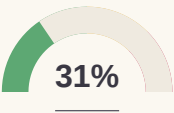
Mild pattern worth tracking

GUT–IMMUNE BALANCE

Total WBC (4.9) is marginally below the functional floor, monocytes are relatively elevated at 10.0%, and globulin is above optimal at 3.1 g/dL, while the Neutrophil:Lymphocyte ratio, hs-CRP and ESR are optimal. This is a low-grade, non-acute pattern, and in her context it points to the gut: frequent childhood antibiotics, bloating with gluten, dairy, cruciferous vegetables, beans, peppers and fermented foods, a constipation tendency, and two autoimmune conditions (Hashimoto's, ITP) that share an immune-tolerance root. The gut also governs about 20% of T4-to-T3 conversion, B12 and magnesium absorption, and estrogen recycling — so it touches nearly every other concern in this report. The pending GI-MAP stool test is the right next step; results will guide whether the plan is microbiome restoration, digestive support (stomach acid and enzymes), or a structured food-reintroduction protocol.

Rationale:

White Blood Cell Count (WBC) ↓, Monocytes % ↑, Globulin - Total ↑



Mild pattern worth tracking

Important information about how to read this report.

Disclaimer

41 [Disclaimer](#)

5

Disclaimer

This Report contains information for the exclusive use of the named recipient and contains confidential and privileged information. If you are not the named recipient or have not been given permission by the named recipient, you are prohibited from reading or using this report in any way, and any distribution, dissemination or copying of this Report is strictly prohibited.

All information in this Report is provided for educational purposes only, including without limitation the optimal ranges set forth in this Report. Neither this Report, nor any of the information contained in this Report, is intended for, or should be used for the purpose of, medical diagnosis, prevention, or treatment, including self-diagnosis, prevention, or treatment. This Report should not be used as a substitute for professional medical care, and should not be relied upon in diagnosing or treating a medical condition, ailment, or disease.

The optimal ranges set forth in this Report are general reference recommendations only, and are not intended to be guidelines for any specific individual. The optimal ranges set forth in this Report are for educational purposes only, and are not intended to be, nor should they be construed as, a claim or representation of medical diagnosis or treatment.

Neither this Report, nor any information contained in this Report, should be considered complete or exhaustive. This Report does not contain information on all diseases, ailments, physical conditions or their treatment. This report is based on the lab data provided, which may or may not include all relevant and appropriate measures of your biochemistry.

The absence of a warning for a given drug or supplement or any combination thereof in no way should be construed to indicate that the drug or supplement or any combination thereof is safe, effective, or appropriate for you. Statements made about a supplement, product, or treatment have not been evaluated by the Food and Drug Administration. Any mentioned supplement, product, or treatment is not intended to diagnose, treat, cure or prevent any disease.

You are encouraged to confirm any information obtained from this Report with other sources, and review all information regarding any medical condition or the treatment of such condition with your physician.

NEVER DISREGARD PROFESSIONAL MEDICAL ADVICE, DELAY SEEKING MEDICAL ADVICE OR TREATMENT, OR STOP CURRENT MEDICAL TREATMENT, BECAUSE OF SOMETHING YOU HAVE READ IN THIS REPORT.

Consult your physician or a qualified healthcare practitioner regarding the applicability of any of the information or materials provided in this Report in regards to your symptoms or medical condition. Always consult your physician before beginning a new treatment, diet, exercise, fitness plan, or health plan or program, and before taking any drug, supplement, or any combination thereof, or if you have questions or concerns about your health, a medical condition, or any plan or course of treatment. If you think you have a medical emergency, call 911 or your doctor immediately.