

**METABOLIC HEALTH: THE FOUNDATION OF HEALTH AND
LONGEVITY PART 2 - MEASURING METABOLIC HEALTH: THE TESTS
THAT MATTER**

Your Weekly Newsletter

by Dr. Nick Sieveking

August 27, 2026



Last week, we introduced the concept of metabolic health and explored the continuum from optimal metabolic function to metabolic dysfunction, insulin resistance, prediabetes, and ultimately type 2 diabetes.

THE METABOLIC HEALTH CONTINUUM

From Optimal Health to Diabetes



We also highlighted the far-reaching consequences of poor metabolic health—both for individuals and for our country as a whole.



==> The Cost of Metabolic Dysfunction: More than 1 million American lives and approximately \$1.7 trillion in economic costs each year.

This week, we move from understanding metabolic health to measuring it—and, most importantly, acting on what we find.

At [Ageless Solutions](#), evaluating metabolic health goes far beyond checking a fasting glucose level, cholesterol panel, or the number on a scale. It also extends well beyond the 5 traditional criteria used to define **metabolic syndrome**:

Abdominal obesity	Waist circumference ≥ 40 inches in men or ≥ 35 inches in women; ethnicity-specific thresholds may apply
Elevated triglycerides	≥ 150 mg/dL, or receiving treatment
Low HDL cholesterol	< 40 mg/dL in men or < 50 mg/dL in women, or receiving treatment
Elevated blood pressure	$\geq 130/85$ mmHg, or receiving antihypertensive treatment
Elevated fasting glucose	≥ 100 mg/dL, or receiving treatment for elevated glucose/diabetes

Our goal is to identify **metabolic dysfunction as early as possible—before it progresses further along the continuum toward diabetes, cardiovascular disease, fatty liver disease, and other chronic conditions.**

To accomplish this, we take a comprehensive approach that combines a detailed personal and family health history with an assessment of lifestyle, physical and body-composition findings, advanced laboratory testing, and targeted imaging. Together, these tools allow us to uncover metabolic abnormalities that may be present long before conventional testing reveals overt disease.

We will also begin exploring the strategies we use to **improve and restore metabolic health**, including targeted nutrition and lifestyle interventions, weight-management strategies, pharmaceuticals, nutraceuticals, and hormone optimization when clinically appropriate.

Finally, we return to **Patient X** to review his initial evaluation and abnormal test results—and demonstrate how those findings are translated into an individualized treatment plan combining lifestyle modification with targeted pharmaceutical, nutraceutical, and hormonal interventions.

The goal is not simply to diagnose disease. It is to identify metabolic dysfunction early enough to change its trajectory.

20 KEY BIOMARKERS FOR ASSESSING METABOLIC HEALTH			
Ranked by Clinical Importance			
IMPORTANCE: ★★★★★ = highest ★★★★★☆ = high ★★★☆☆ = moderate ★★☆☆☆ = supplemental			
RANK	TEST / MEASURE	IMPORTANCE	WHY IT MATTERS
1	Waist circumference Normal: <37 inches for men and <31.5 inches for women	★★★★★	Simple, high-yield marker of abdominal/visceral adiposity; strongly associated with insulin resistance and cardiometabolic risk.
2	Fasting insulin Normal: 2–10 µIU/mL	★★★★★	Can reveal hyperinsulinemia and early insulin resistance before fasting glucose or HbA1c becomes abnormal.
3	Fasting plasma glucose Optimal: 70–90 mg/dL	★★★★★	Core measure of glucose regulation and a standard criterion for prediabetes, diabetes, and metabolic syndrome.
4	Hemoglobin A1c (HbA1c) Normal: 4.8–5.4%	★★★★★	Reflects average glycemic exposure over roughly 2–3 months. Elevated HbA1c → reflects chronic hyperglycemia and impaired glucose regulation, often indicating insulin resistance, prediabetes, or diabetes
5	Triglycerides Normal: <150 mg/dL Optimal: < 100 mg/dL	★★★★★	Often rise with hepatic insulin resistance, visceral adiposity, excess energy intake, and increased VLDL (Very-Low-Density Lipoprotein=> <u>BAD</u>) <u>production</u> .
6	HDL cholesterol (HDL-C) Goal: Men: ≥40 mg/dL Women: ≥50 mg/dL	★★★★★	Low HDL-C commonly accompanies insulin resistance and hypertriglyceridemia; most useful as part of the overall metabolic pattern.
7	Blood pressure Optimal: <120/80 mmHg	★★★★★	A major component of metabolic syndrome and an important manifestation of vascular and metabolic dysfunction.
8	HOMA-IR Goal: <2.0	★★★★★	Calculated from fasting glucose and insulin; provides a practical estimate of insulin resistance.

RANK	TEST / MEASURE	IMPORTANCE	WHY IT MATTERS
9	Apolipoprotein B (ApoB) Optimal: <80 mg/dL	★★★★★	Measures the number of circulating atherogenic (BAD) lipoprotein particles and refines Atherosclerotic Cardiovascular Disease risk associated with metabolic dysfunction.
10	Visceral-fat estimate DEXA Scan visceral adipose tissue (VAT): ideally <100 cm ²	★★★★★	More metabolically relevant than total body fat because visceral fat is closely associated with insulin resistance, metabolic dysfunction-associated steatotic liver disease (MASLD), inflammation, and cardiovascular risk. Measured by DEXA or MRI scan.
11	Continuous glucose monitoring (CGM) Optimal daily range: 70–140 mg/dL	★★★★☆	Abnormal CGM → suggests impaired glucose regulation, excessive post-meal glucose excursions, and/or increased glycemic variability, potentially indicating insulin resistance or early metabolic dysfunction.
12	Non-HDL cholesterol Normal: <130 mg/dL Optimal: <100 mg/dL	★★★★☆	Captures cholesterol carried by all ApoB-containing atherogenic particles and is particularly useful when triglycerides are elevated.
13	High-sensitivity CRP (hs-CRP) Goal: <1.0 mg/L	★★★★☆	Marker of systemic inflammation and cardiovascular risk; visceral adiposity often produces low-grade inflammation, although hs-CRP is nonspecific.
14	LDL cholesterol (LDL-C) Optimal: <100 mg/dL	★★★★☆	Important cardiovascular-risk marker, but LDL-C alone does not fully characterize metabolic health or atherogenic particle burden.
15	LDL particle number (LDL-P) Optimal: <1,000 nmol/L	★★★★☆	Can uncover LDL-C/particle-number discordance, although ApoB usually provides similar actionable information more simply.
16	Lipoprotein(a) [Lp(a)] Normal: <50 mg/dL	★★★★☆*	Important for lifetime ASCVD risk but largely genetically determined; it is a cardiovascular-risk modifier rather than a direct metabolic-health marker.
17	AST Optimal metabolic/liver-health target: <25–30 U/L	★★★★☆	Useful with other liver markers but less specific for metabolic liver disease because AST also originates from skeletal muscle and other tissues.
18	Ferritin optimal range: 50–150 ng/mL	★★★★☆	May rise with inflammation, insulin resistance, metabolic dysfunction-associated steatotic liver disease (MASLD), or iron overload but is highly nonspecific.
19	Small dense LDL / LDL particle size Pattern A / larger LDL particles preferred (>20.5–20.8 nm)	★★★★☆	Smaller, denser LDL particles (Pattern B) are associated with greater atherogenic risk.
20	Oxidized LDL (oxLDL) No standard value	★★★★☆	Lower is better; Elevated oxLDL → increased oxidative stress and oxidation of LDL particles, suggesting greater vascular inflammation and atherogenic risk

ENDOCRINE CONTRIBUTORS

These tests generally identify conditions that can cause, mimic, or worsen metabolic dysfunction rather than directly measuring metabolic health.

TEST	CLINICAL ROLE
TSH	Best initial thyroid screening test; hypothyroidism can contribute to weight gain, dyslipidemia, and reduced energy expenditure.
Free T4	Helps determine thyroid hormone availability and interpret an abnormal TSH.
Free T3	Useful selectively, but generally lower priority for routine metabolic screening.
TPO antibody (TPOAb)	Identifies autoimmune thyroid disease; useful when thyroid dysfunction is suspected.
Total testosterone	Important when clinically indicated, particularly in men with obesity, insulin resistance, or symptoms of hypogonadism.
Free testosterone	Especially useful when SHBG is abnormal or total testosterone does not fit the clinical picture.
SHBG (Sex Hormone Binding Globulin)	Low SHBG → may suggest insulin resistance, hyperinsulinemia, visceral adiposity, and hepatic metabolic dysfunction.
Estradiol	Important when clinically indicated but not routinely necessary for general metabolic-health assessment.
Cortisol	Useful when hypercortisolism or another cortisol disorder is clinically suspected; not a routine metabolic screening test.
DHEA-S	Useful in selected endocrine evaluations but lower priority as a general metabolic-health marker.

At the end of last week’s issue, we introduced **Patient X**—a real patient at Ageless Solutions who has decided to change the trajectory of his metabolic health and pursue a path toward optimal health and longevity.

Patient X: Metabolic Dysfunction

Brief Summary of Abnormal / Clinically Relevant Findings

Category	Abnormal Finding	Metabolic Significance
Weight / Adiposity	62-year-old male; 5'9", 210 lbs.; BMI 31 despite recent 30-lb weight loss	Residual excess weight may still reflect visceral adiposity and metabolic risk. Still Class I Obesity.
Cardiovascular	Hypertension on amlodipine ; hyperlipidemia on rosuvastatin	Established cardiometabolic risk factors.
Family History	Strong family history of stroke	Raises concern for inherited cardiovascular risk.
Nutrition	Frequent fast food, processed foods, overeating, poor snacks, several Dr. Peppers/week	Pattern favors insulin resistance, dyslipidemia, and visceral fat accumulation.
Muscle / Exercise	Loss of muscle mass; limited resistance training	Reduced lean mass can impair glucose disposal and insulin sensitivity.
Sleep	4-7 hours/night; disrupted sleep; sleep apnea	Can worsen insulin resistance, appetite control, blood pressure, and cardiovascular risk.
Stress	Moderate-high stress (4-7/10)	May adversely affect sleep, glucose regulation, and appetite.
Hormonal / Sexual	Low libido and erectile dysfunction; uses Viagra	Consider hormonal and vascular contributors.

Patient X--Abnormal Laboratory Results

April 10, 2026

Category	Laboratory Test	Patient Result	Normal Reference Range	Abnormality
Nutrition	Vitamin D, 25-OH	34.3 ng/mL	30.0-108.0 ng/mL	Low-Normal
Glycemic control	Glucose, Fasting	315 mg/dL	70-100 mg/dL	Markedly high
Glycemic control	Hemoglobin A1c	14.8%	≤5.6%	Markedly high
Glycemic control	Glycated serum protein	720 μmol/L	≤285 μmol/L	Markedly high
Insulin resistance	HOMA-IR	8.2	0.7-2.0	High
Insulin resistance	Insulin	10.6 μU/mL	2.6-24.9 μU/mL	Within range
Cardiovascular	HDL cholesterol, direct	32.8 mg/dL	≥56.0 mg/dL	Low
Cardiovascular	Cholesterol/HDL ratio	4.0	≤3.5	High
Cardiovascular	Apolipoprotein B	101 mg/dL	≤89 mg/dL	High
Cardiovascular	Lipoprotein(a)	43.9 mg/dL	≤29.0 mg/dL	High
Inflammation	Homocysteine	9.9 μmol/L	≤9.0 μmol/L	Mildly high
Inflammation	High-sensitivity CRP	1.5 mg/L	≤0.9 mg/L	High

Category	Laboratory Test	Patient Result	Normal Reference Range	Abnormality
Metabolic panel	Sodium	134.1 mmol/L	136.0-145.0 mmol/L	Mildly low
Metabolic panel	Chloride	93.2 mmol/L	98.0-107.0 mmol/L	Low
Thyroid	Reverse T3	39.5 ng/dL	7.0-23.0 ng/dL	High
Hormonal	SHBG	102.0 nmol/L	19.3-76.4 nmol/L	High
Hormonal	Pregnenolone	0.20 ng/mL	0.38-3.5 ng/mL	Low
Hormonal	Testosterone, total	688.0 ng/dL	203.4-1415.5 ng/dL	Within range
Hormonal	Free testosterone	6.33 ng/dL	3.25-30.66 ng/dL	Low-Normal
Growth/metabolic	IGF-1	58.9 ng/mL	43.0-220.0 ng/mL	Low-Normal
CBC	RDW-SD	45.0 fL	35.1-43.9 fL	Mildly high
Adipokine	Leptin	19.2 ng/mL	1.1-13.4 ng/mL*	High
Fatty acids	Eicosapentaenoic acid (EPA)	0.11%	0.15-2.26%	Low
Fatty acids	Arachidonic acid (AA)	21.83%	5.50-19.01%	High
Fatty acids	Total omega-6	37.11%	11.03-34.96%	High
Fatty acids	AA/EPA ratio	>127	2.5-10.9	Markedly high
Fatty acids	Omega-3 Index	4.11%	8.0-12.65%	Low

Important clinical context: The dominant abnormality is severely uncontrolled diabetes: glucose 315 mg/dL, HbA1c 14.8%, glycated serum protein 720 μ mol/L, and HOMA-IR 8.2.

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Patient X: Physical and Anthropometric Measurements

- Blood pressure- 142/85
- Height and weight- 5'9" 210 lbs.
- BMI- 31.0 kg/m² (**Class I obesity**)
- Waist circumference- 40 inches
- Abdominal or central obesity

Patient X: Notable Categories

1. Nutrition

Vitamin D is conventionally sufficient but low-normal. There is no evidence of iron deficiency or anemia.

→ Good Starting Point

Maintaining adequate vitamin D supports bone and muscle health, but vitamin D alone will not correct the severe metabolic dysfunction.

2. Glycemic control

Severely uncontrolled diabetes. Likely contributes to thirst, dry mouth, frequent urination, dehydration, fatigue, blurred vision, cramps and muscle loss.

High risk for: retinopathy, neuropathy, kidney disease, infection, poor wound healing, cardiovascular disease and hyperglycemic crisis if not promptly controlled.

3. Insulin resistance

Marked insulin resistance. Although insulin is within range, it is inadequate relative to glucose of 315 mg/dL, suggesting impaired beta-cell compensation.

Progressive beta-cell failure may make diabetes harder to control and increase the likelihood of requiring insulin. Persistent resistance promotes visceral fat, fatty liver, vascular disease and muscle loss.

4. Cardiovascular

LDL-C appears controlled, but **low HDL** and **elevated ApoB** indicate residual atherogenic risk. Diabetes, hypertension and elevated Lp(a) compound that risk.

Increased lifetime risk for coronary artery disease, heart attack, stroke and peripheral arterial disease despite an apparently favorable LDL-C.

5. Inflammation

Low-grade inflammation rather than severe systemic inflammation. It may reflect obesity, hyperglycemia or another inflammatory stimulus.

Persistent inflammation can accelerate endothelial dysfunction and atherosclerotic risk, particularly when combined with diabetes, hypertension, elevated ApoB and Lp(a).

6. Metabolic panel

The low sodium is probably largely dilutional from hyperglycemia; corrected sodium is approximately 137-139 mmol/L. Kidney filtration and liver enzymes are currently reassuring.

Kidney function is preserved, but prolonged diabetes and hypertension increase future kidney-disease risk. A urine albumin-to-creatinine ratio is needed to detect early diabetic kidney injury.

7. Thyroid

The conventional thyroid profile is euthyroid/normal. Elevated reverse T3 is nonspecific and may accompany metabolic stress, illness, calorie restriction or medication effects.

Reverse T3 alone does not establish thyroid disease or justify thyroid-hormone treatment. Follow TSH and free T4 according to symptoms and clinical context.

8. Hormonal

High SHBG reduces bioavailable testosterone, leaving **free testosterone low-normal** despite a strong total testosterone. This likely contributes to low libido, erectile dysfunction and difficulty maintaining muscle. (**Patient X** Free Testosterone Goal is 2% of Total, or > 12 ng/dL)

Symptoms may persist if SHBG remains elevated, but erectile dysfunction is likely multifactorial, including diabetic, vascular, medication and sleep-apnea effects.

9. Growth/metabolic

IGF-1 is at the very low end of the reference range. In this clinical context, a low-normal value may accompany reduced anabolic reserve, loss of lean mass, poor sleep, inadequate protein intake, calorie restriction, or chronic illness.

Interpret IGF-1 in the context of symptoms, body composition, nutrition, sleep, and the broader hormonal evaluation rather than as an isolated marker.

10. Adipokine

Patient X's elevated **leptin** is consistent with increased fat mass and possible **leptin** resistance. **Leptin** is produced by fat cells and normally signals the brain that energy stores are adequate, helping regulate appetite.

When **leptin** signaling is impaired, hunger and weight regain may be harder to control, potentially reinforcing visceral adiposity, inflammation, and insulin resistance.

11. Fatty acids

Very low EPA exposure or incorporation with a markedly **unfavorable omega-6/omega-3 balance**. This may favor a more pro-inflammatory lipid-mediator environment.

A **low omega-3 index** is associated with greater cardiovascular risk and greater inflammatory burden.

The Data Are In. Now It's Time to Change the Trajectory.

So, what comes next for Patient X in the Ageless Solutions Metabolic Health Plan?

Patient X — [Ageless Solution's](#) Metabolic Health Plan & Recommendations

Category	Recommendation	Purpose / Goal
Nutrition	Low-glycemic, anti-inflammatory diet.	Improve glycemic control, insulin sensitivity, inflammation, and overall metabolic health.
Carbohydrate Intake	Consume <50 g carbohydrates daily.	Reduce glucose excursions and insulin demand.
Food Quality	Focus on lean proteins, healthy fats, and increased vegetables, especially leafy greens.	Improve nutrient density, satiety, body composition, and metabolic health.
Foods to Eliminate	Remove refined carbohydrates and ultra-processed foods.	Reduce glycemic load and improve overall dietary quality.
Cardiovascular Assessment	Schedule coronary artery calcium (CAC) score. "Cardiac Calcium CT Scan"	Further assess subclinical coronary atherosclerosis and cardiovascular risk. Cardiology referral if significant CAD.
Resistance Training	Weight training at least 2–3 times/week.	Build/preserve lean muscle and improve insulin sensitivity and glucose disposal.
Aerobic Activity	Walk daily; slowly increase pace toward Zone 2 training.	Improve cardiovascular fitness, mitochondrial function, insulin sensitivity, and metabolic flexibility.
Glucose Monitoring	Begin FreeStyle Libre 3 CGM; monitor blood glucose closely.	Identify glucose patterns and responses to food, exercise, and treatment.
GLP-1/GIP Therapy	Tirzepatide 7.5 mg SQ weekly.	Improve glycemic control, appetite regulation, weight management, and cardiometabolic risk factors.
Initial Supplements	PhytoMulti; OmegaGenics; K2+D3; OptiMag; berberine; ALA; pregnenolone; CoQ10; Prime Strength & Amino Complex; glycine; DHEA 25 mg and methylated B12/folate (lemon).	Targeted nutritional and metabolic support based on laboratory findings and treatment goals.
Testosterone Therapy	Testosterone 80 mg IM weekly.	Increase Free testosterone levels. Support clinically indicated androgen replacement, including muscle mass, strength, libido, body composition, and well-being.
Follow-Up	Repeat fasting laboratory testing in 3 months.	Assess response to nutritional, exercise, pharmaceutical, hormonal, and nutraceutical interventions.
Follow-Up Labs	Comprehensive Metabolic Panel; HbA1c; fasting insulin; fasting glucose; glycosylated serum protein; hs-CRP; male testosterone panel; IGF-1.	Reassess glycemic control, insulin resistance, inflammation, metabolic status, and hormonal response.
Blood Pressure	Check at home Blood Pressure morning and night every other day	Monitor response to reduction in inflammation. May need to lower blood pressure medication dose

Patient X — Nutraceutical Support for Metabolic Health

Supplement	How It May Support Metabolic Health
PhytoMulti	Provides vitamins, minerals, and phytonutrients that may help fill nutritional gaps and support energy metabolism, antioxidant defenses, and normal cellular function.
OmegaGenics	Provides omega-3 fatty acids (EPA/DHA), which can lower triglycerides and support cardiovascular health while helping modulate inflammation. Particularly relevant with a low omega-3 index.
Vitamin D3 + K2	Vitamin D supports glucose metabolism, muscle function, immune health, and bone health. Vitamin K2 supports normal calcium metabolism and bone health. Correcting vitamin D insufficiency is especially important when levels are suboptimal.
OptiMag	Provides magnesium, an essential mineral involved in glucose metabolism, insulin signaling, muscle function, blood-pressure regulation, and cellular energy production.
Berberine	May lower fasting glucose and HbA1c and improve insulin sensitivity and lipid parameters in some patients, making it one of the more directly metabolically relevant supplements in the regimen.
Alpha-Lipoic Acid (ALA)	Acts as an antioxidant and mitochondrial cofactor. May modestly improve insulin sensitivity and glucose utilization and has evidence supporting use for symptoms of diabetic peripheral neuropathy.
Pregnenolone	A precursor steroid hormone used to synthesize several downstream hormones. Direct metabolic benefits are not well established; its role is better considered part of individualized hormonal management.
CoQ10	Supports mitochondrial energy production and antioxidant defenses. May be particularly useful in patients taking statins, which can reduce circulating CoQ10 levels; direct metabolic effects are less established.
Prime Strength & Amino Complex	Provides amino-acid/protein support to help preserve and rebuild lean muscle, particularly with resistance training. Skeletal muscle is a major site of insulin-mediated glucose disposal.
Glycine	Supports glutathione synthesis, collagen production, and multiple metabolic pathways. Lower glycine levels are associated with insulin resistance; supplementation is being studied for possible effects on glucose regulation and oxidative stress.
DHEA — 25 mg	A precursor hormone that may support androgen production, body composition, energy, and well-being when DHEA levels are low. Its metabolic effects are variable, so supplementation is best individualized and monitored with hormone levels.
Methylated B12 / Folate (Lemon)	Provides bioactive forms of vitamin B12 and folate that support methylation, red blood cell formation, neurologic function, homocysteine metabolism, and normal cellular energy pathways. Most beneficial when intake or laboratory status is suboptimal.

Clinical Perspective: These nutraceuticals are adjuncts to the primary metabolic strategy. The greatest expected impact comes from improving glucose and insulin control, reducing visceral fat, rebuilding skeletal muscle, lowering cardiovascular risk, and optimizing hormonal and nutritional status.

Follow-up: Reassess at 3 months and adjust the plan based on clinical and laboratory response.

FACELIFT JOURNEY REVEAL

As you may recall from previous newsletters, we have been following a very special patient through her facelift journey. Parts 1 and 2 covered the pre-operative and day-of surgery documentation as well perspective from the patient. Today we are excited to share with our readers the third and final segment of the journey where we unveil the post-operative results.

By sharing this information, I aim to demystify the facelift experience and ease concerns about discomfort and recovery, helping patients understand that the process is often far more manageable than they anticipate with amazing, natural, and dreamed about results just weeks away. Please take a moment to view Part 3 of her journey below:

WATCH NOW

BEFORE



AFTER





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P R I M E

THE LIFT
YOU CAN **SEE**

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Ultherapy PRIME® uses microfocused ultrasound energy and real-time visualization to safely and effectively activate the skin's regenerative potential, creating a personalized, visible, natural-looking lift that can last up to a year or more.

For Salma, Ultherapy PRIME’s long-lasting lift fits perfectly into her busy schedule: “Because it’s noninvasive, it has zero downtime, so I can quickly return to what I love doing most.”

If you are looking for a natural-looking lift after just one session, **don't miss our Ultherapy PRIME launch event September 1st. RSVP by August 25!**

RSVP to Event

SPECIAL PROMO!

FREE Metabolic Test:

**Get your fasting insulin and HbA1c levels
checked at Ageless Solutions.**

Expires 8/31/26.

Call to Book!

STAY TUNED!

Be on the lookout for next week's newsletter:

**METABOLIC HEALTH: THE FOUNDATION OF HEALTH AND LONGEVITY
PART 3 — RESTORING METABOLIC HEALTH: A PRACTICAL ROADMAP.**

[Newsletter Archives](#)



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