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Multi-System Biological Age Assessment

A Clinical Data Report

56

YEARS — COMPOSITE BIOLOGICAL AGE

Chronological Age: 71 · Advantage: −15 Years

BIOLOGICAL AGE	BONE DENSITY Z-SCORE	TESTOSTERONE	RESTING METABOLIC RATE
56	**+2.9**	**624 ng/dL**	**2,269 kcal/da**
vs 71 chrono	Top 0.2% for age	Avg 71yo: 200–400	Faster than peers

Data sources: SiPhox 57-Biomarker Panel · DEXA Body Composition Scan · Clinical RMR Gas Analysis Dexcom G7 CGM · Renpho 8-Electrode Bioimpedance · Cardiovascular & Functional Assessment

April 2026 · markskoda.com

1. The Problem With Standard Biological Age Algorithms

In March 2026, a 57-biomarker blood panel through SiPhox Health was fed into a standard biological age algorithm. The result: 68 years old — three years younger than my chronological age of 71. That number is systematically wrong, and understanding why explains what this report is attempting to do differently.

Standard biological age algorithms are population regression models. They take a large dataset, build a statistical model that predicts chronological age from biomarkers, and run individual numbers through it. This works near the center of the distribution. For genuine outliers, it misclassifies in predictable ways.

WHY THE ALGORITHM FAILS FOR THIS PROFILE

The cholesterol problem: Total cholesterol of 264 receives a penalty. The algorithm cannot see that the ApoB:ApoA1 ratio is 0.64 (optimal), LDL:HDL is 2.2 (good), or that pharmacological intervention is already running.

The BMI problem: At 6'2" and 209 lbs, BMI is 26.9. The algorithm penalizes this without knowing lean mass is 140.8 lbs — preserved through a 58-pound weight loss — or that bone density Z-score is +2.9.

The missing markers problem: No consumer algorithm properly weights testosterone, DHEA-S, bone density Z-score, resting metabolic rate, or sustained aerobic capacity. These are the markers where the true age advantage lives.

2. The Clinical Dataset

2.1 SiPhox 57-Biomarker Panel — March 16, 2026

Hormonal / Endocrine

MARKER	RESULT	OPTIMAL RANGE	STATUS
Testosterone (Total)	624 ng/dL	400–800	Optimal — up from 573 in December
Free Testosterone	8.81 ng/dL	7–20	Optimal
DHEA-S	166.4 µg/dL	150–350	Optimal
TSH	0.9 mIU/L	0.5–2.5	Optimal
Cortisol (morning)	23.4 µg/dL	10–15	Elevated — context: hour 40 of fast, high stress period
Estradiol	48.2 pg/mL	10–40	Elevated — aromatization at 30.1% body fat; DIM initiated
LH	6.88 mIU/mL	1.7–8.6	Good

Cardiovascular

MARKER	RESULT	OPTIMAL RANGE	STATUS
Apolipoprotein B (ApoB)	132 mg/dL	40–70	Elevated — pravastatin initiated April 2026
LDL Cholesterol (calc)	160 mg/dL	40–90	Elevated — primary pharmacological target

MARKER	RESULT	OPTIMAL RANGE	STATUS
HDL Cholesterol	72 mg/dL	>60	Good
Triglycerides	160 mg/dL	40–70	Elevated — Zone 2 cardio targeting
ApoB:ApoA1 Ratio	0.64	0–0.7	Optimal — protective despite absolute values
LDL:HDL Ratio	2.2	0–2.5	Good
LDL-C:ApoB Ratio	1.21	1.5–2.0	Below optimal — small dense LDL phenotype

Metabolic, Renal, Nutritional

MARKER	RESULT	OPTIMAL RANGE	STATUS
HbA1c	6.2%	4.0–5.6%	Improving — was 7.4% July 2025, insulin-independent
eGFR	98.44 mL/min/1.73m²	>90	Excellent renal function
Albumin	5.4 g/dL	4.0–5.0	Optimal
hsCRP	1.06 mg/L	<1.0	Borderline — inflammatory marker, manageable
Ferritin	222.8 ng/mL	50–150	Elevated — blood donation completed post-test
Vitamin D	72.8 ng/mL	50–80	Good
Vitamin B12	540 pg/mL	400–900	Optimal
Folate	16.4 ng/mL	6–25	Optimal

2.2 DEXA Body Composition — March 23, 2026

METRIC	VALUE	CONTEXT / SIGNIFICANCE
Total Body Fat	30.1% / 64.1 lbs	Primary reduction target — down from est. ~35% at July 2025 baseline
Total Lean Mass	140.8 lbs	Exceptional preservation through 58-pound total weight loss
VAT Volume	135.86 in³	21% above At-Risk threshold of 112.10 in³ — Zone 2 protocol active
Android:Gynoid Ratio	1.22	Central adiposity pattern; target <1.0
Trunk Body Fat	34.4%	Highest regional concentration — primary composition target
Arms Body Fat	25.7%	Good — resistance training effect visible
Bone Density T-Score	+2.4	Well above average — skeletal biology of ~45yo
Bone Density Z-Score	+2.9	Top 0.2% for age 71 — exceptional. Near-zero fracture risk.

2.3 Functional Measurements

MEASUREMENT	VALUE	SIGNIFICANCE
Resting Metabolic Rate (gas analysis)	2,269 kcal/day	Faster than age-matched peers — clinically measured, not estimated
Blood Pressure	117/73 mmHg	Textbook optimal — top quartile for age
Resting Heart Rate	67–70 bpm	Strong cardiovascular efficiency
CGM Time in Range	96–97%	Near-clinical-trial level glycemic control
Zone 2 Exercise	50 min sustained, 101–113 bpm	Weights + treadmill combined — HR maintained throughout
Height / Weight / BMI	6'2" / 209 lbs / 26.9	BMI contextually meaningless — lean mass 140.8 lbs
Waist Circumference	34 inches	Central adiposity measure — in progress

3. Methodology — The 8-System Weighted Model

Rather than a single algorithm, this assessment evaluates eight distinct physiological systems. Each system biological age is derived by mapping individual biomarkers within that system to their age-reference data — asking not 'what is this number' but 'what age does this number represent.' The composite is a weighted mean, with weights reflecting each system's relative contribution to all-cause mortality per current longevity literature.

SYSTEM	BIOLOGICAL AGE	WEIGHT	KEY MARKERS
Renal / Hepatic	45	10%	eGFR 98 · Albumin 5.4 · Creatinine 0.82 — all optimal
Musculoskeletal	50	15%	T-score +2.4 · Z-score +2.9 · Lean mass 140.8 lbs preserved
Nutritional	50	5%	B12 540 · Folate 16.4 · Vitamin D 72.8 — all optimal
Endocrine / Hormonal	52	15%	Testosterone 624 · DHEA-S 166 · TSH 0.9 / Cortisol elevated
Inflammatory	57	8%	hsCRP 1.06 borderline · Cortisol 23.4 stress-driven
Metabolic	58	20%	RMR 2,269 exceptional / A1C 6.2% · TG 160 elevated
Cardiovascular	60	25%	BP 117/73 · HDL 72 positive / ApoB 132 · LDL 160 — Rx active
Body Composition	62	2%	BF 30.1% · VAT 135.86 in³ — primary intervention target

SYSTEM	BIO AGE	WEIGHT	CONTRIBUTION
Renal / Hepatic	45	10%	4.50
Musculoskeletal	50	15%	7.50
Nutritional	50	5%	2.50
Endocrine / Hormonal	52	15%	7.80
Inflammatory	57	8%	4.56
Metabolic	58	20%	11.60
Cardiovascular	60	25%	15.00
Body Composition	62	2%	1.24
COMPOSITE BIOLOGICAL AGE		**100%**	**54.70 → 55**

Composite rounds to 55–56. Presented as 56 throughout this report. Range: 54–58 reflecting uncertainty in contextual factors (cortisol stress load, fasted-state blood draw timing).

4. System-by-System Analysis

4.1 Renal / Hepatic — Biological Age: 45

eGFR of 98.44 mL/min/1.73m² places renal function firmly in the excellent range. Albumin at 5.4 and creatinine at 0.82 confirm healthy protein synthesis and efficient filtration. These markers reflect a kidney profile consistent with a healthy 45-year-old — remarkable given that declining renal function is one of the most age-sensitive systems. Note: AST:ALT ratio of 2.92 on the March 30 partial panel likely reflects exercise-induced muscle catabolism rather than hepatic stress. With pravastatin now active, liver function monitoring is appropriate at 48–72 hours post rest-day.

4.2 Musculoskeletal — Biological Age: 50

The standout finding in this entire dataset. Bone density T-score of +2.4 and Z-score of +2.9 places skeletal health nearly three standard deviations above the average 71-year-old. This is the skeleton of a man in his late 40s to early 50s — zero osteoporosis or osteopenia risk. Lean mass of 140.8 lbs has been preserved through a 58-pound weight loss, which is clinically difficult. This is the direct result of resistance training four days per week throughout the weight loss phase. Bilateral muscle symmetry (0.4–0.6 lb arm-to-arm and leg-to-leg difference) reflects balanced, consistent training.

4.3 Endocrine / Hormonal — Biological Age: 52

Testosterone at 624 ng/dL — naturally, without supplementation — is in the optimal range for men in their mid-40s to early 50s. The average 71-year-old male has testosterone between 200–400 ng/dL. This single marker places hormonal biology roughly 20 years younger than chronological age. DHEA-S at 166.4 reflects optimal adrenal function. TSH at 0.9 reflects excellent thyroid function. Cortisol at 23.4 is the primary downside pressure — elevated under a documented high-stress period (drawn at hour 40 of a fast, during active litigation and business transition). Elevated cortisol suppresses the testosterone:cortisol ratio to 0.026 (optimal: 0.04–0.08) despite excellent testosterone. Stress load reduction, ashwagandha, and magnesium glycinate are the targeted interventions.

4.4 Metabolic — Biological Age: 58

The headline metabolic finding is the RMR of 2,269 kcal/day — clinically measured through respiratory gas analysis, not estimated. This is faster than age-matched peers and reflects a metabolic engine running at the level of a significantly younger system. A1C at 6.2% is fair, but the trajectory tells the real story: this was 7.4% in July 2025, and the subject was insulin-dependent. Insulin independence has been restored entirely through protocol — fasting, CGM, resistance training, and supplement stack. Triglycerides at 160 and VLDL at 32 are elevated, both of which are responsive to Zone 2 cardio and fasting cycles. Improvement expected by June 15.

4.5 Cardiovascular — Biological Age: 60

The primary limiter in this assessment. Blood pressure of 117/73 and resting heart rate of 67–70 are excellent. HDL of 72 is good. These are the protective factors. ApoB at 132 mg/dL (optimal: 40–70) and LDL at 160 mg/dL with a LDL-C:ApoB ratio of 1.21 (optimal: 1.5–2.0) together indicate a small dense LDL phenotype — the most atherogenic lipoprotein pattern. This is the most significant cardiovascular risk finding. Pravastatin was initiated in April 2026. An 8–12 week response is expected by the June 15 checkpoint, with projected ApoB moving to 85–105 mg/dL. If this target is met, the cardiovascular system biological age moves from 60 to approximately 50, shifting the composite biological age to 52–54.

4.6 Body Composition — Biological Age: 62

Body fat at 30.1% with VAT volume of 135.86 in^3 — 21% above the At-Risk threshold of 112 in^3 — is the primary body composition concern. This system carries only 2% weight in the composite because it is actively being addressed and is more properly reflected through its cascade effects on the cardiovascular and metabolic scores. VAT is metabolically active fat: it secretes inflammatory cytokines, disrupts insulin signaling, and directly drives the lipid phenotype seen in the cardiovascular section. Zone 2 cardio (30 minutes, 4% incline) was added specifically as a VAT-targeting protocol. This is the correct intervention. Projected reduction: 8% per 90-day cycle.

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5. VAT Reduction Timeline

DATE	VAT VOLUME (in³)	vs THRESHOLD	STATUS
March 23, 2026 (baseline)	135.86	+23.76 above 112.10	At Risk — 21% above threshold
June 15, 2026 (projected)	~125	+12.9 above 112.10	Reducing — first quarterly read
September 15, 2026 (projected)	~115	+2.9 above 112.10	Approaching threshold
December 15, 2026 (projected)	~106	Below threshold	Below At-Risk — milestone
March 2027 (projected)	~97	Below threshold	Progress toward optimal
June 2027 (projected)	~90	Below threshold	Optimal zone — target achieved

Reduction rate assumes sustained Zone 2 protocol (30 min, 4% incline), continued fasting cycles, and resistance training 4x/week. Rate of approximately 8% per 90-day cycle is consistent with published literature on aerobic exercise + caloric deficit effects on VAT specifically.

6. June 15, 2026 — Quarterly Checkpoint Projections

June 15, 2026 is the first quarterly checkpoint with pravastatin, Zone 2, and DIM all active. DEXA, SiPhox full panel, and Renpho calibration are aligned on the same cycle.

MARKER	CURRENT	PROJECTED JUN 15	PRIMARY DRIVER
ApoB	132 mg/dL	85–105 mg/dL	Pravastatin ~8 weeks active
LDL Cholesterol	160 mg/dL	100–125 mg/dL	Pravastatin primary
Triglycerides	160 mg/dL	125–145 mg/dL	Zone 2 + fasting cycles
Estradiol	48.2 pg/mL	35–42 pg/mL	DIM + VAT reduction
Cortisol	23.4 µg/dL	16–19 µg/dL	Stress resolution + adaptogens
Ferritin	222.8 ng/mL	90–150 ng/mL	Post blood donation
Testosterone	624 ng/dL	615–660 ng/dL	Protocol maintenance
A1C	6.2%	5.9–6.1%	CGM management + metabolic trend
VAT Volume	135.86 in³	122–127 in³	Zone 2 cardio protocol
Body Fat %	30.1%	27–28%	Caloric deficit + composition shift
Biological Age (composite)	56 years	52–54 years	Cardiovascular + VAT improvement

7. Life Expectancy Modeling

SSA actuarial baseline for a 71-year-old American male: 82.4 years. The following adjustments are applied based on individual marker profiles and their documented association with all-cause mortality in the longitudinal literature.

FACTOR	ADJUSTMENT	BASIS
Blood pressure 117/73	+2.5 yrs	Top quartile for age — strong CV protection
Aerobic exercise (Zone 2, sustained)	+3.5 yrs	Most powerful longevity predictor — top 10% for age
Bone density Z-score +2.9	+1.5 yrs	Near-zero fracture risk; fractures are major mortality events post-70
Testosterone 624 ng/dL naturally	+1.5 yrs	Protective: sarcopenia, cognitive, cardiovascular function
eGFR 98 — excellent renal function	+1.5 yrs	CKD is significant all-cause mortality driver
RMR faster than age-matched peers	+1.0 yr	Metabolic vitality marker — inverse of metabolic age decline
CGM time-in-range 97%	+0.5 yr	Glycemic control restored from prior insulin dependency
ApoB 132 — atherogenic particle burden	–2.5 yrs	Being addressed with pravastatin — partially recoverable
VAT 135.86 in³ — elevated visceral fat	–2.0 yrs	Zone 2 protocol active — recoverable over 12–18 months
A1C 6.2% — T2D history	–1.0 yr	Trend strongly positive; residual risk from prior severity

SCENARIO	LIFE EXPECTANCY	CONDITIONS
SSA Population Average	**82.4 years**	71yo American male baseline
Current Protocol	**~90 years**	Net +7.6yr adjustment from above analysis
Protocol Optimized (ApoB + VAT targets met)	**90–93 years**	Negative adjustments reduced by 60–80%
Maximum Upside (all markers optimal)	**93–96 years**	All cardiovascular + metabolic markers at target

The central estimate under current protocol execution is approximately 90 years. The 90–96 range is achievable if the active interventions (pravastatin, Zone 2, DIM) deliver expected results and cortisol normalizes as structural stressors resolve. Both the negative adjustments currently pulling the estimate toward 90 rather than 93+ are directly addressable — this is not a fixed picture.

8. Active Protocol Summary — April 2026

INTERVENTION	TYPE	TARGET	STATUS
Pravastatin	Pharmacological	ApoB 132→85-105 · LDL 160→100-125	Active — ~8 days
DIM 100–200mg daily	Supplement	Estradiol 48.2→35-42 · Aromatization reduction	Active — new
Zone 2 Cardio 30min 4% incline	Exercise	VAT 135.86→<112 in³ · Primary VAT driver	Active — daily
Resistance Training 4×/week	Exercise	Lean mass preservation · Testosterone maintenance	Active — ongoing
Extended Therapeutic Fasting	Metabolic	Insulin sensitivity · VAT mobilization · Glucose control	Active — ongoing
Dexcom G7 CGM	Monitoring	Glucose 80–90 fasting · 97% time in range	Active — continuous
Renpho 8-electrode scale	Monitoring	Daily body composition vs DEXA calibration	Active — daily
Ashwagandha + Mag Glycinate	Supplement	Cortisol 23.4→16-19 · HPA axis regulation	Recommended

Data sources: SiPhox 57-Biomarker Panel (March 16, 2026) · DEXA Scan, Live Lean Nashville (March 23, 2026) · Clinical RMR Gas Analysis (March 23, 2026) · Dexcom G7 CGM (continuous) · Renpho 8-Electrode Bioimpedance Scale (calibrated). Clinical validation: Vanderbilt University Medical Center · Giles A. Lippard, APRN.

This report documents one individual's clinical data and personal health optimization protocol. Nothing here constitutes medical advice. Work with your physician before modifying your health protocol. April 2026 · markskoda.com