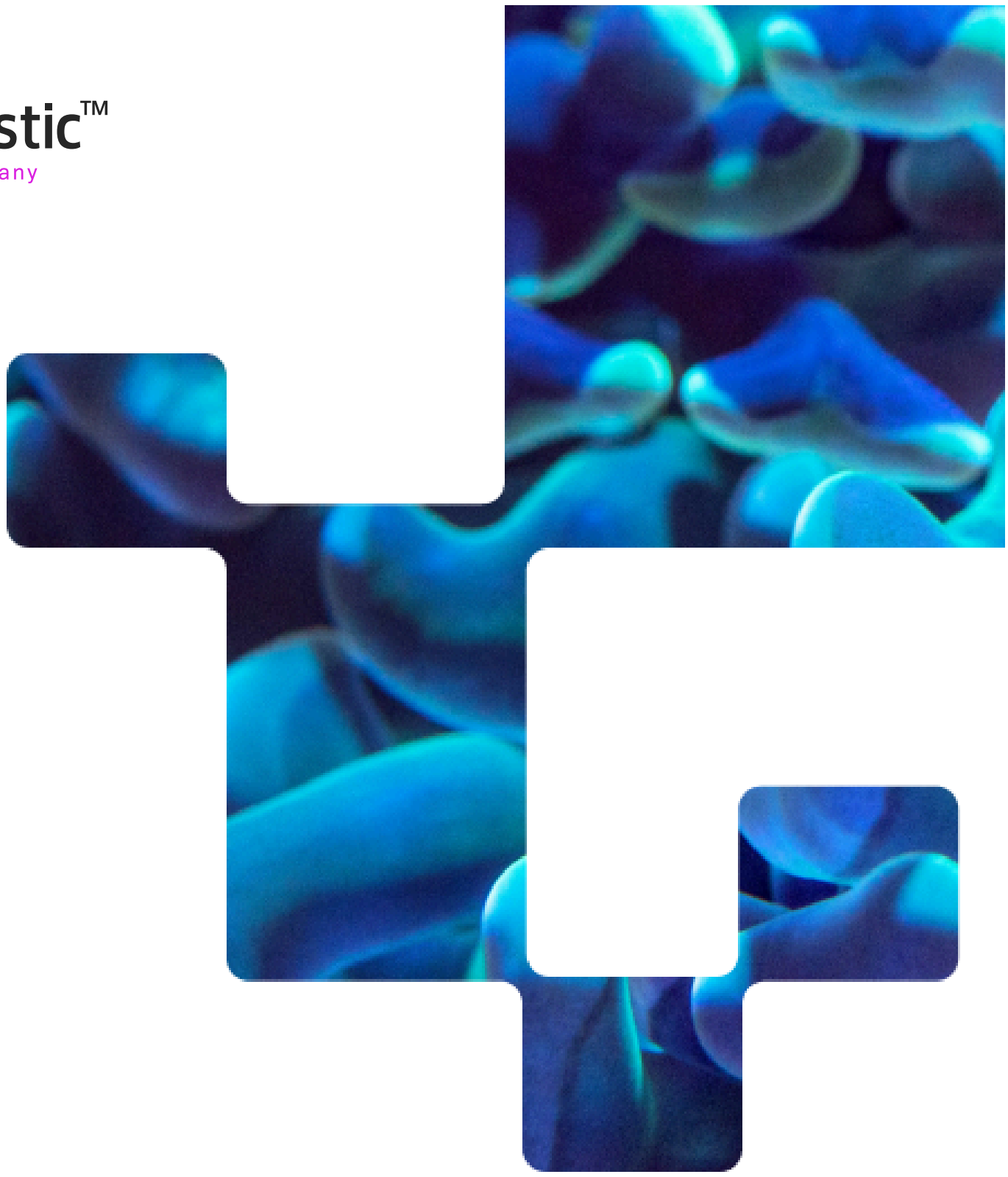
TruDiagnostic™
The Epigenetic Company



Advanced TruAge Report

Jane Doe

Age: 28 | Sex: Female

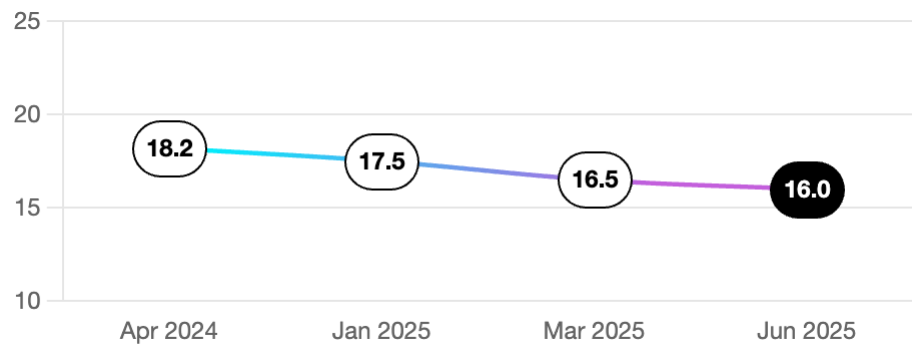
ID#: 2A3ALUD

Collected: 05/05/2025 | Reported: 06/23/2025

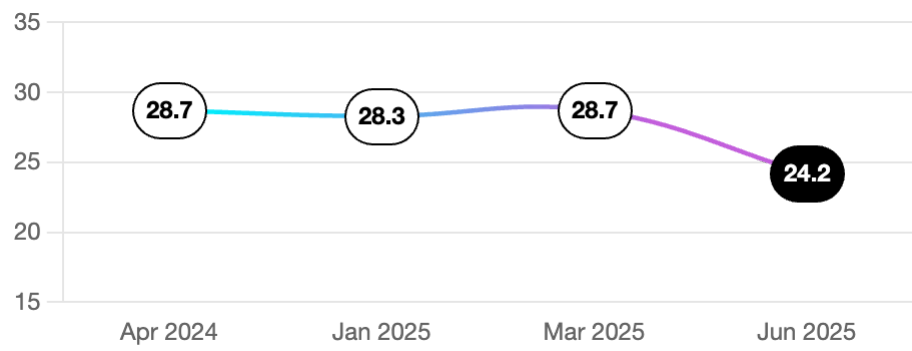
Aging Summary

Chronological Age: 28.2

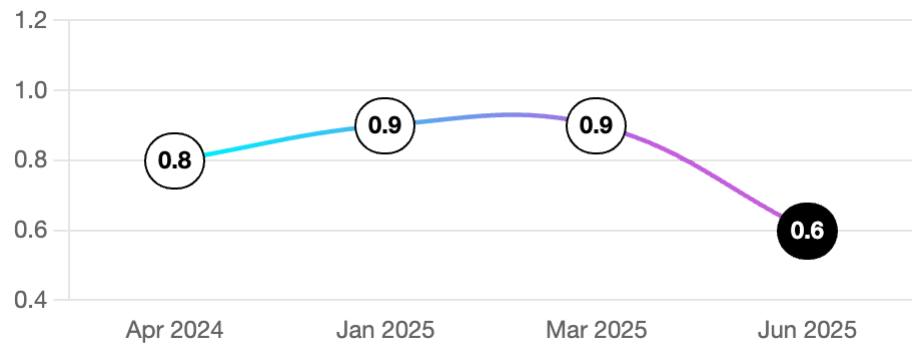
OMICm Age



Symphony Age



Pace of Aging



DEVELOPED WITH HARVARD

OMICm Age

Chronological Age: 28.2

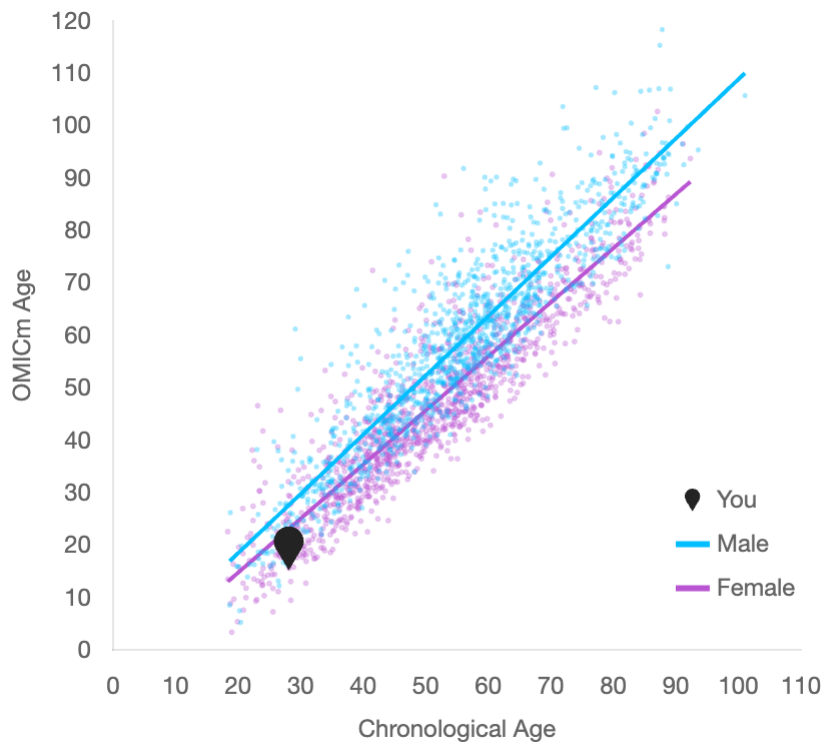
OMICm Age

16.0

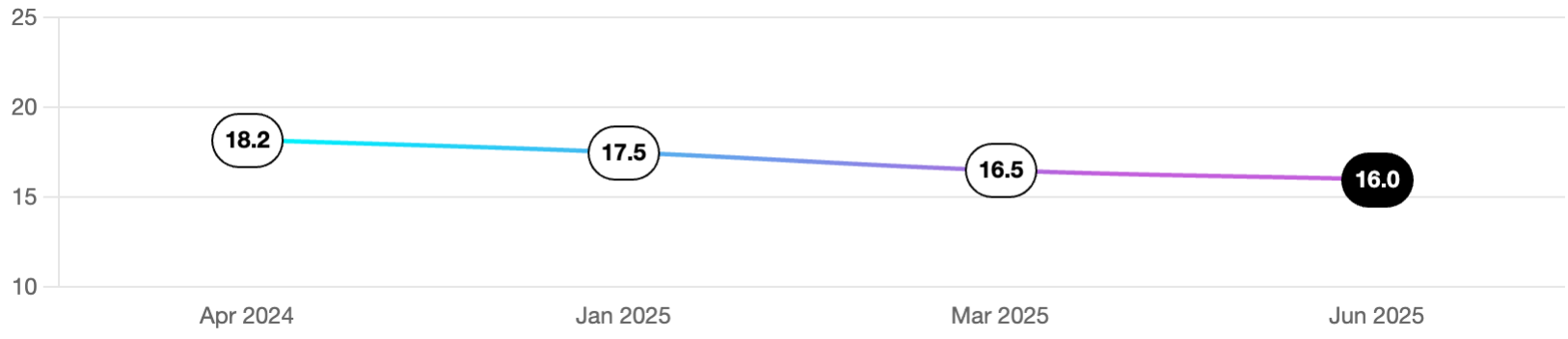
Younger

18.4%

Your OMICm Age is **lower** than 81.6% of people of the same age and sex.



Results Over Time



DISCLAIMER: The population graph and percentile for OMICm Age are based on observed and validated data patterns from an equal distribution of Harvard research participants and TruDiagnostic clients to emulate a population of average health.

Most Actionable Epigenetic Biomarkers

Epigenetic Biomarker (EBs) are compared against a balanced reference dataset composed of individuals from both the Harvard and TruDiagnostic cohorts. We identify individuals of the same sex and a similar age (within ±5 years) to create a personalized comparison group. Above the 80th percentile: Indicates your outcome is higher than 80% of individuals in the cohort. Below the 20th percentile: Indicates your outcome is lower than 80% of individuals in the cohort.

*** Listed in order of impact on OMICm age. Find the rest of your Epigenetic Biomarkers at the end of the report**

Serum Paraoxonase/arylesterase 1

Low

2.1%

Function

Serum Paraoxonase/Arylesterase 1 (PON1): An enzyme with antioxidant properties; linked to cardiovascular health.

Recommendations

- Increase selenium intake with foods like Brazil nuts, seafood, and whole foods
- Consider chokeberry extract and pomegranate
- Minimize intake of trans fat

Chokeberry extract | Brazil nuts | Seafood | Pomegranate

Vanillactic Acid

High

81.6%

Function

Vanillactate: A product of gut microbial metabolism of phenolic compounds; involved in energy pathways.

Recommendations

- Manage blood pressure
- Reduce sodium intake
- Eat a heart-healthy diet
- Reduce stress
- Check heart function

Matrix-remodeling-associated protein 5

High

86.3%

Function

Matrix-Remodeling-Associated Protein 5: A protein involved in extracellular matrix remodeling and tissue repair.

Recommendations

- Reduce general systemic inflammation through an anti-inflammatory diet and an active lifestyle
- Reduce stress

Anti-inflammatory diet

SYMPHONY Age

Chronological Age: 28.2

This advanced approach dives into the age of **11 distinct organ systems.**

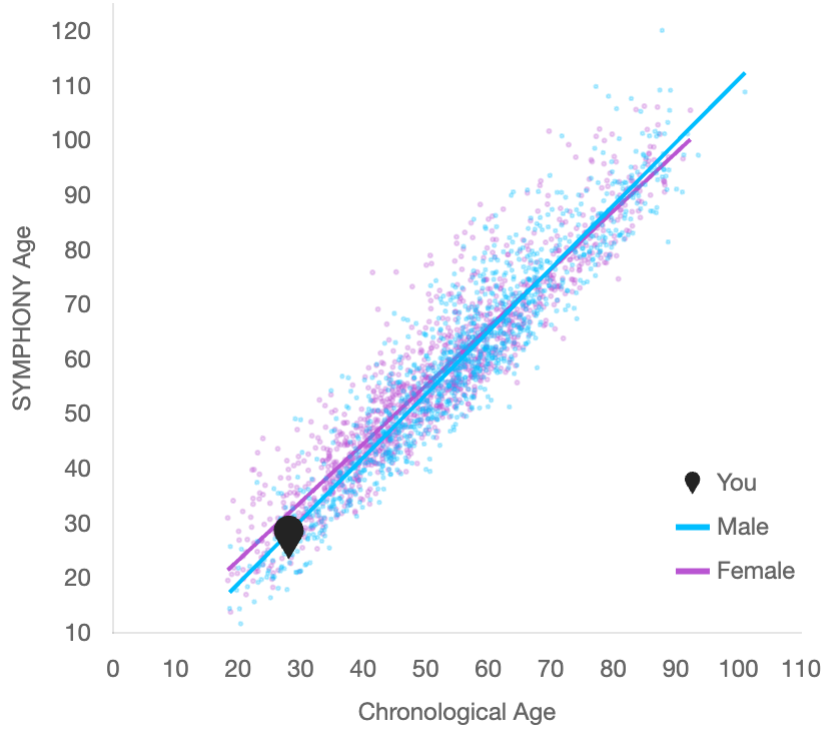
SYMPHONY Age

24.2

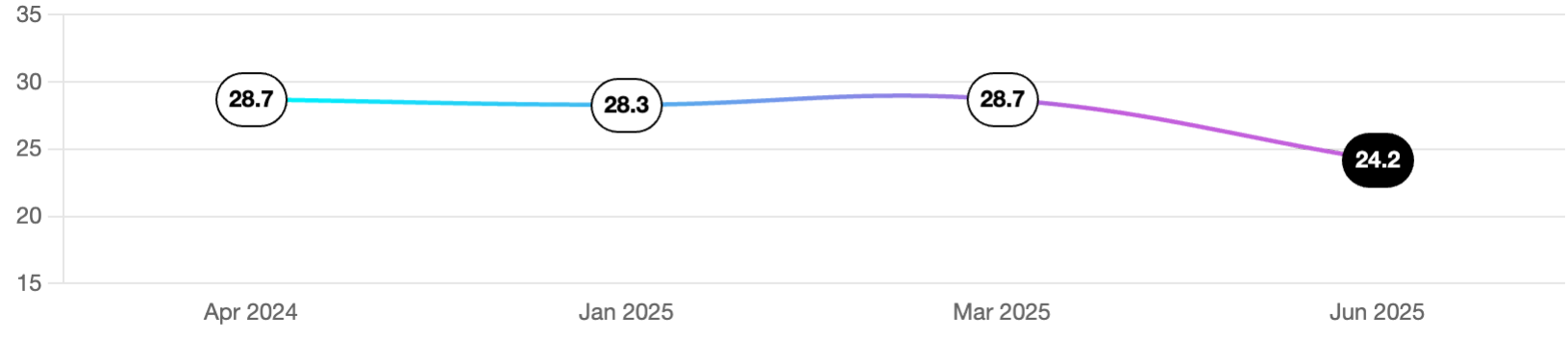
Younger

12.8%

Your SYMPHONY Age is **lower** than 87.2% of people of the same age and sex.



Results Over Time



DISCLAIMER: The population graph and percentile for SYMPHONY Age are based on observed and validated data patterns from an equal distribution of Harvard research participants and TruDiagnostic clients to emulate a population of average health.

Compare the age of **11 distinct organ systems** versus your chronological age

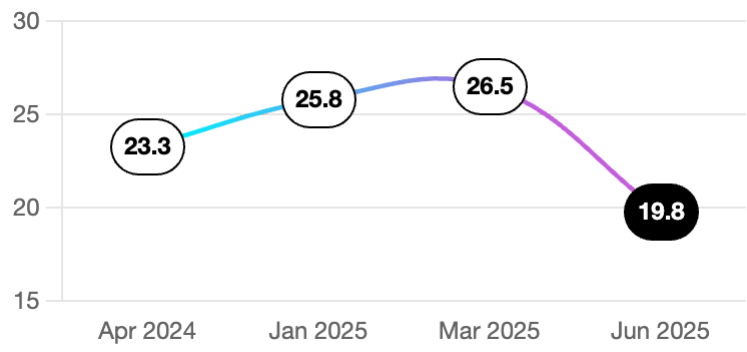
How was this clock created and designed?

Many clocks have used blood based biomarkers and their changes as we get older to predict OMICm age. For SYMPHONY Age, the researchers did this with biomarkers which were specific for each organ system. While previous clocks (like PhenoAge) did this with 9 blood markers, SYMPHONY Age incorporates 133 biomarkers for training to develop this clock. In addition to having a large and detailed number of clinical datapoints, this study is also one of the largest for clock development with approximately 8,000 participants. Together, this gives us an incredibly robust clock associated with organ specific clinical biomarkers which is highly predictive of aging outcomes.

Systems Related Biomarkers

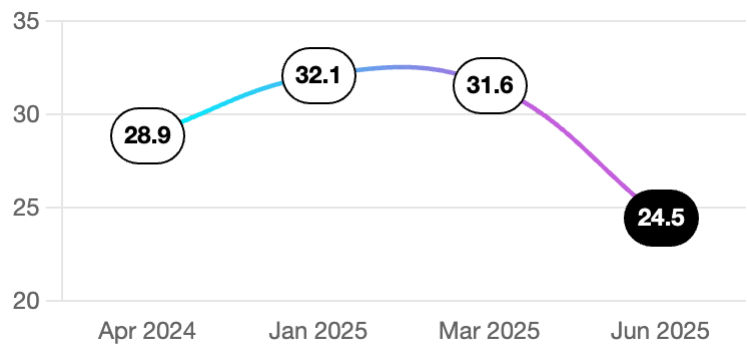
Blood

Biomarkers: Ferritin, Hematocrit, Hemoglobin, Mean Corpuscular Hemoglobin, Mean Corpuscular Hemoglobin Conc, Mean Corpuscular Volume, Mean Platelet Volume, Platelet Distribution width, Platelet Count, Red Blood Cell Count, Red Cell Distribution Width



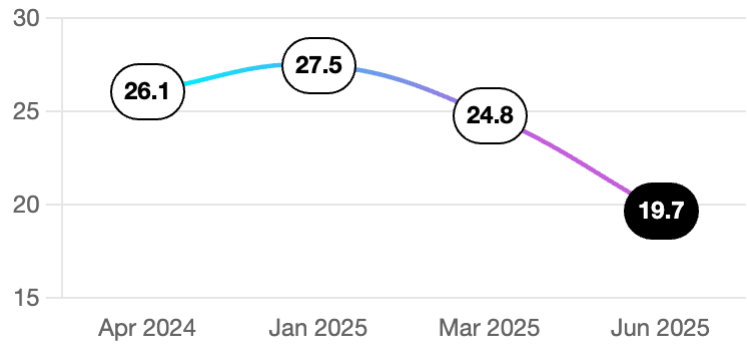
Brain

Biomarkers: Homocysteine, BDNF (serum), Clusterin, Stroke, Total mental status summary score, Total cognition summary score, Immediate word recall, Delayed word recall, Total word recall summary score, Serial 7s



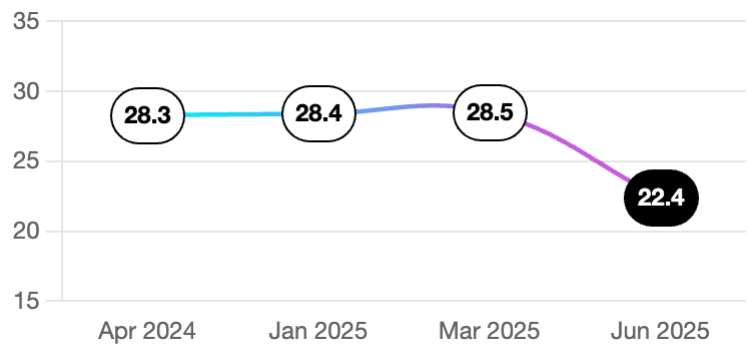
Inflammation

Biomarkers: Ferritin, C-Reactive Protein, Transforming Growth Factor Beta, Interleukin 10, Interleukin 1 Receptor Antagonist, Interleukin 6, Tumor Necrosis Factor Receptor 1



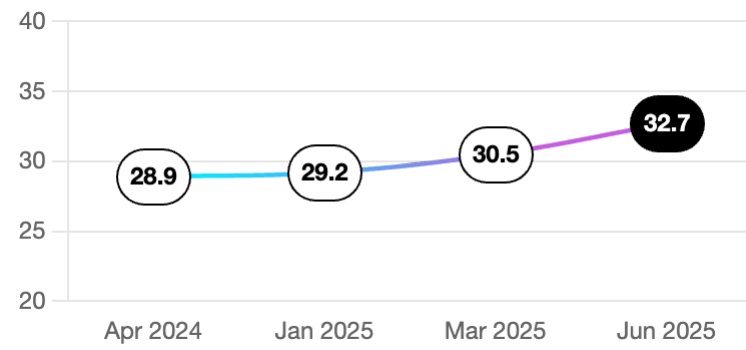
Heart

Biomarkers: Shortness of breath while awake, PCcomponents of Grimage, Previous High Blood Pressure, Previous Heart Attack, Previous Stroke, Homocysteine, BMI



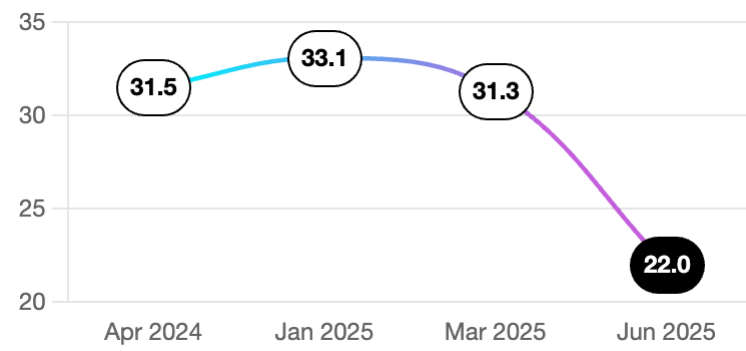
Hormone

Biomarkers: IGF-1, DHEAS



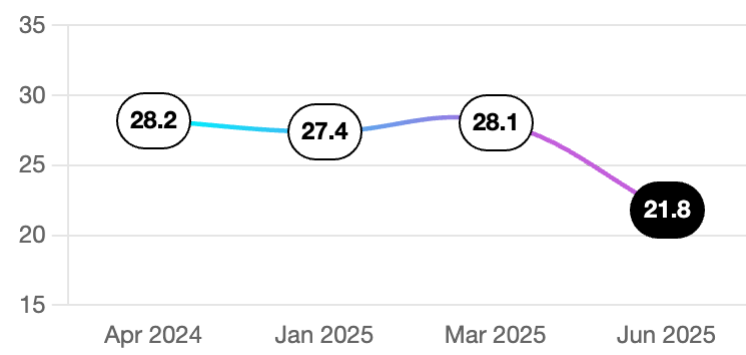
Immune

Biomarkers: Eosinophil Count, Lymphocyte Count, Monocyte Count, Neutrophil Count, Percent Basophils, Percent Eosinophils, Percent Lymphocytes, Percent Monocytes, White Blood Cell Count, Myeloid Dendritic cells (DC-M) Percentage, Plasmacytoid, Dendritic Cells (DC-P) Percentage, NK Cells: CD56HI Percentage, NK Cells: CD56LO Percentage, CD16- Monocytes Percentage, CD16+ Monocytes Percentage, B Cells Percentage, CD8+ T Cells: Central Memory (CM) Percentage, CD4+ T Cells: Central Memory (CM) Percentage, CD8+ T Cells Percentage, CD8+ T Cells: (TemRA) Percentage, CD4+ T Cells: (TemRA) Percentage, CD4+ T Cells Percentage, IgD+ Memory B Cells Percentage, IgD- Memory B Cells Percentage, CD8+ T Cells: Naïve Percentage, CD4+ T Cells: Naïve Percentage, T Cells Percentage, Naive B Cells Percentage, CD8+T Cells: Effector Memory (Tem) Percentage, CD4+ T Cells: Effector Memory (Tem) Percentage, Natural Killer (NK) Cells Percentage, Monocytes Percentage, Dendritic Cells Percentage



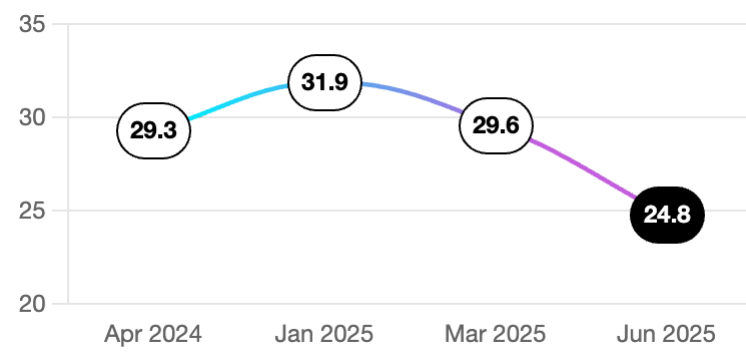
Kidney

Biomarkers: Albumin, Urea Nitrogen, Chloride, Bicarbonate, Creatinine, Cystatin C, Potassium, Sodium



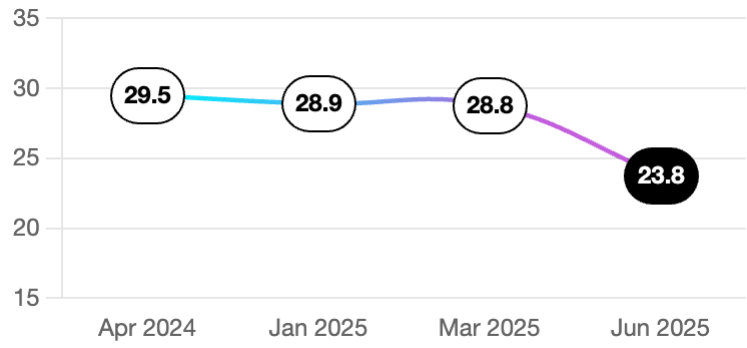
Liver

Biomarkers: Albumin, Alkaline Phosphatase, ALT, AST, Bilirubin, Total Protein



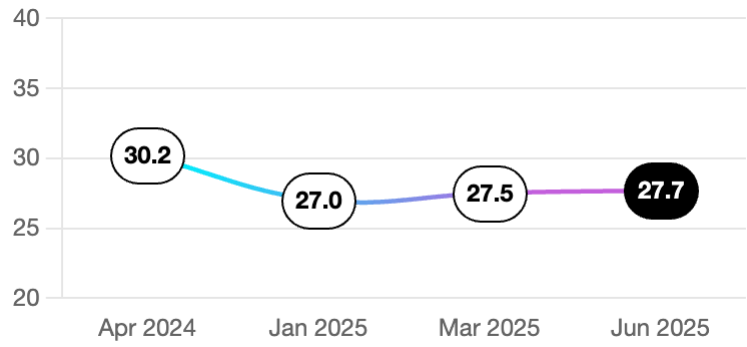
Metabolic

Biomarkers: PCSmoking-packyears, Previous Diabetes, C-Reactive Protein, Glucose-Fasting, HDL-Cholesterol, LDL-Cholesterol, Triglycerides, Interleukin-6, BMI, Waist circumference



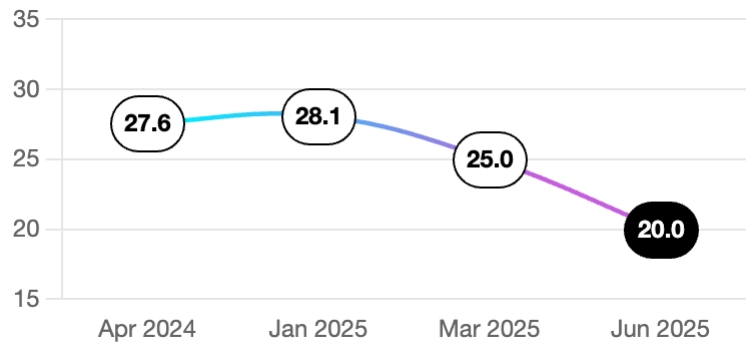
Lung

Biomarkers: Peak expiratory flow, bicarbonate, chronic lung disease, shortness of breath while awake, persistent wheezing, cough, or bringing up phlegm, PCSmoking-packyears



MusculoSkeletal

Biomarkers: Vitamin D3, Dehydroepiandrosterone sulphate, IGF-1, Arthritis, Height, Weight, BMI, some diff-mobility, hand grip strength maximum measurement, semi tandem balance test time, timed walk test time, hand grip strength-left hand hand grip strength-right hand, had back problems, some diff-stoop/kneel/crouch, diff-stoop/kneel/crouch, diff-walk one block, diff-walk sev blocks, some diff-walk one block, some diff-walk sev blocks, diff-climb sev flt stair, diff-climb one flt stair, some diff-clmb sev flt str, some diff-clmb 1 flt stair, diff-get up fr chair, some diff-get up fr chair, diff-reach/extnd arms up, some diff-rch/xtnd arms up, diff-lift/carry 10lbs, some diff-lift/carry 10lbs, side-by-side balance test time, full tandem balance test time, Sum of 7 different functional tests, Combination of all balance scores



DunedinPACE of Aging

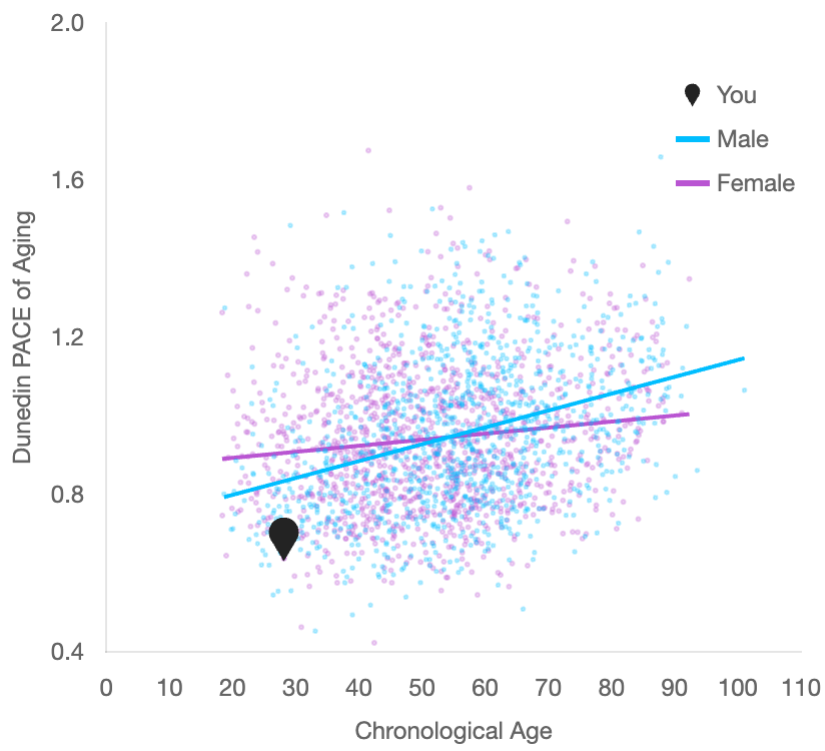
Chronological Age: 28.2

Your Rate of Aging will change based on your lifestyle interventions. Be sure to retest every 3 months to track your progress.

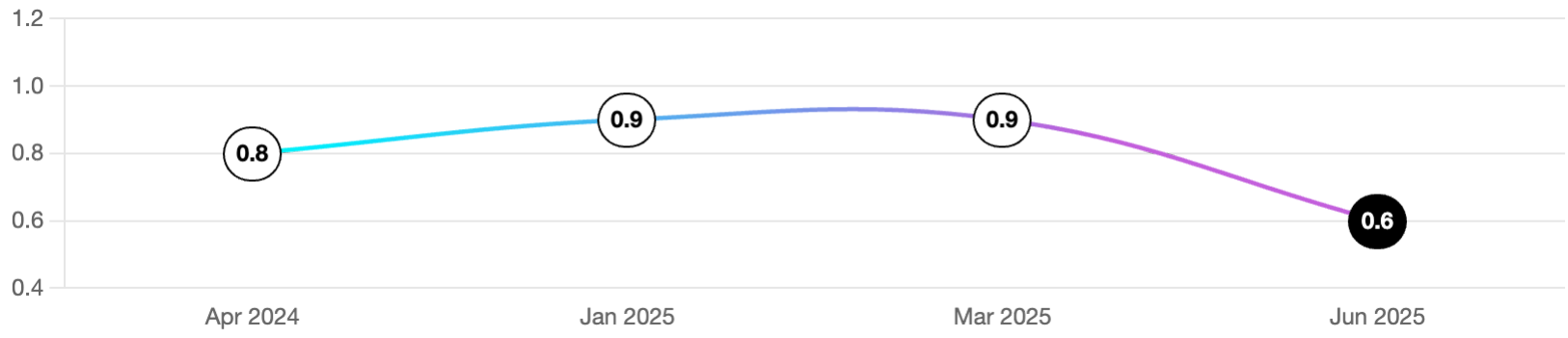
Your score < 1

Each year that passes, your body will biologically age **0.6 years** .

*Based on the last 2-3 months



Results Over Time



DISCLAIMER: The population graph for DunedinPACE of Aging is based on observed and validated data patterns from an equal distribution of Harvard research participants and TruDiagnostic clients to emulate a population of average health.

Immune Health

Naïve CD4T	Normal	63.5%
Memory CD4T	Normal	84.5%
Memory CD8T	Normal	64.9%
Naïve CD8T	Normal	91.2%
Basophils	High	96.5%
B Memory	Normal	94.0%
Naïve B	Normal	86.1%
Regulatory T	High	95.7%
Eosinophils	Normal	85.2%
Natural Killer	Normal	76.3%
Neutrophils	Normal	10.4%
Monocyte	Normal	88.5%
CD4T / CD8T Ratio	Normal	43.8%

CD4/CD8T cell ratio is incredibly informative on disease. A low or inverted CD4/CD8 ratio is an immune risk phenotype and is associated with altered immune function, immune senescence, and chronic inflammation.

Neutrophil To Lymphocyte	Normal	10.4%

The Neutrophil-to-Lymphocyte Ratio (NLR) is obtained by dividing the number of neutrophils by the number of lymphocytes. During physiological stress, neutrophil count increases while lymphocyte count decreases. Physiological stress, driven by illness, inflammation, or psychological stress, can elevate NLR. Therefore, NLR elevation is not exclusive to infection or inflammation but can result from any form of physiological stress, including everyday stress and poor recovery or stress management.

Telomere Length

Chronological Age: 28.2

Shorter telomere length and low telomerase activity are correlated with several chronic preventable diseases.

Telomere Biological Age

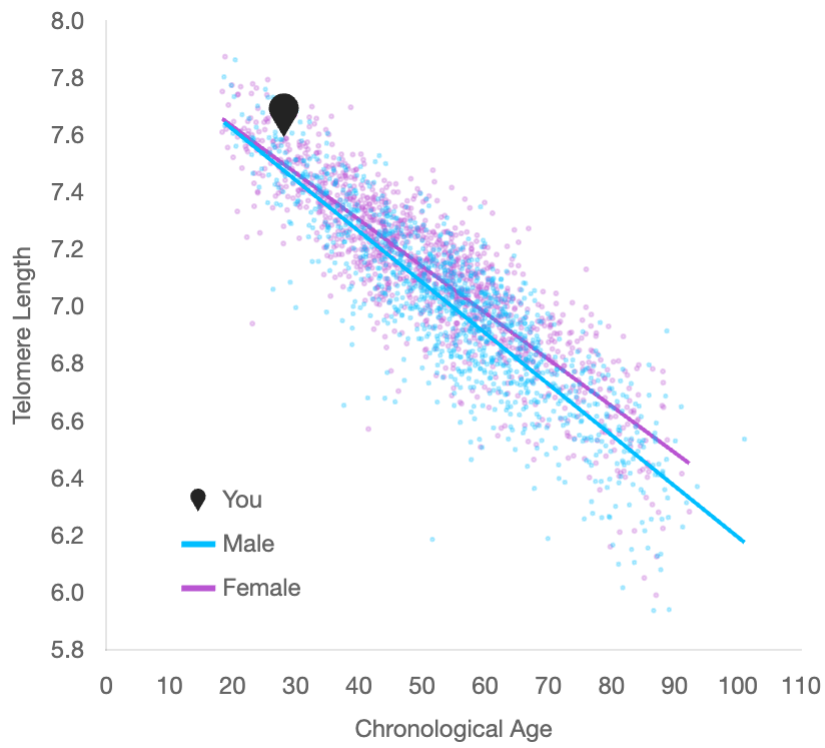
19.5

Younger

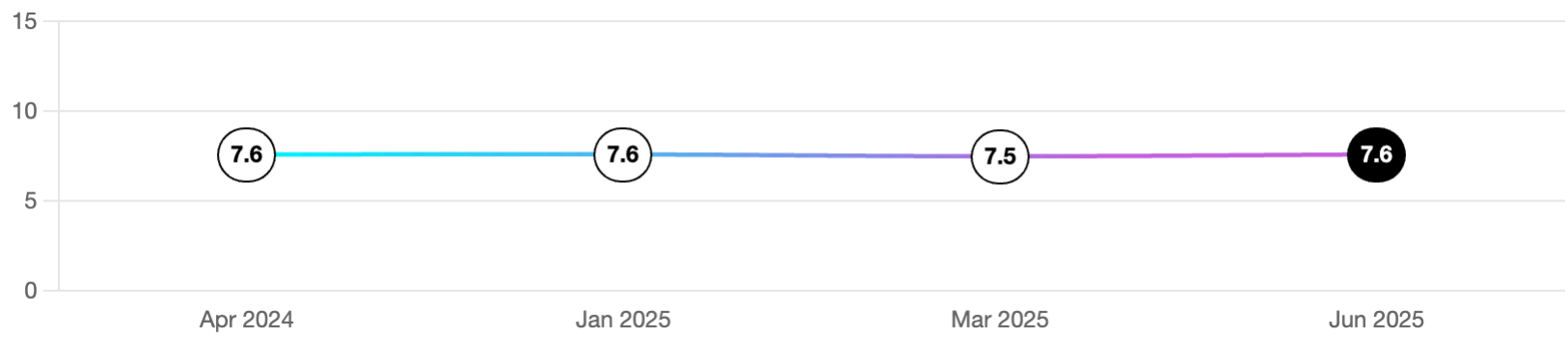
Telomere Length

7.6

5.5 8.5



Results Over Time



DISCLAIMER: Telomere length is mostly determined based on predetermined genetic function. The population graph is based on observed and validated data patterns from an equal distribution of Harvard research participants and TruDiagnostic clients to emulate a population of average health.

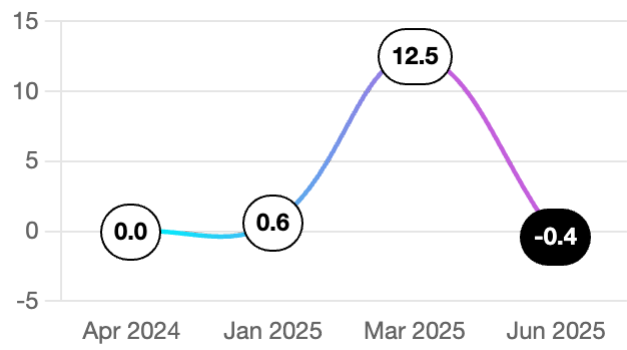
Inflammation

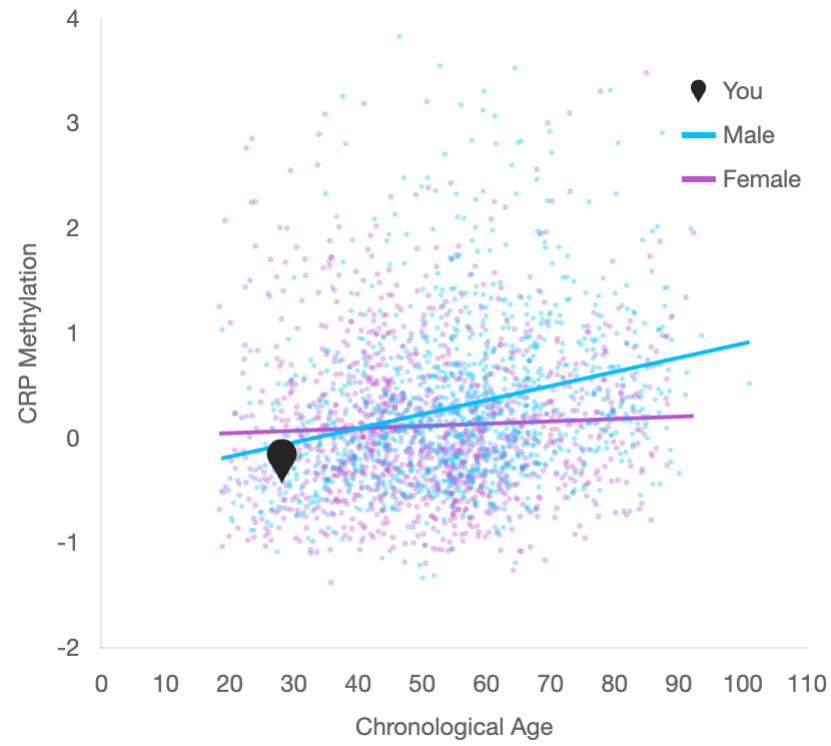
CRP

36.2%

Your CRP methylation level is lower than 63.8% of the population at your same age and sex.

CRP is produced by the liver in response to acute inflammation. DNAm CRP has an inverse relationship with cognitive functions such as memory, speed, and visuospatial functions.



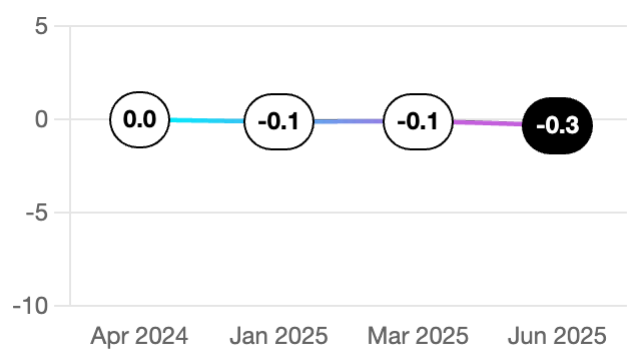


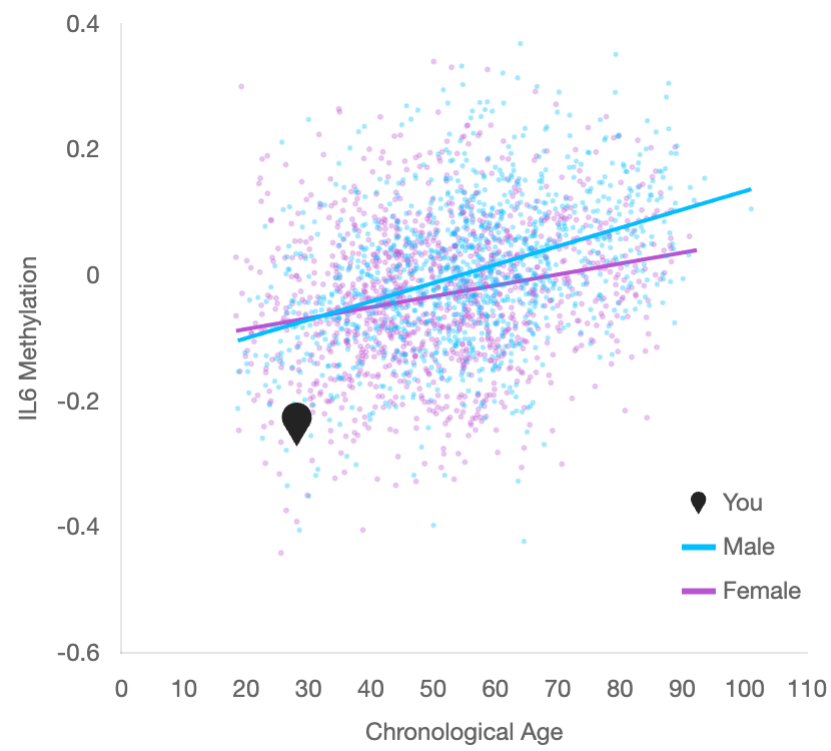
IL-6

5.3%

Your IL-6 methylation level is lower than 94.7% of the population at your same age and sex.

IL-6 is a widely used marker of inflammation and circulating levels of the cytokine typically rise in older age. DNAm IL-6 is positively associated with BMI, self-reported smoking status, and alcohol intake.





DISCLAIMER: The population graph and percentile are based on observed and validated data patterns from an equal distribution of Harvard research participants and TruDiagnostic clients to emulate a population of average health.

DEVELOPED WITH HARVARD

OMICm Fit Age

Chronological Age: 28.2

Tells you how old you are according to your physical fitness and functionality.

For every one year older OMICm FitAge is, there is an average 0.29 decrease in relative grip strength and 0.32 increase in BMI. OMICm FitAge has estimated that **high-fit individuals** (classified through VO2max) have a **1.5 to 2.0 younger** OMICm age compared to low/medium fit individuals in females and males, respectively.

Younger OMICm FitAge was associated with better memory test performance, emphasizing the beneficial role of physical exercise on cognitive health.

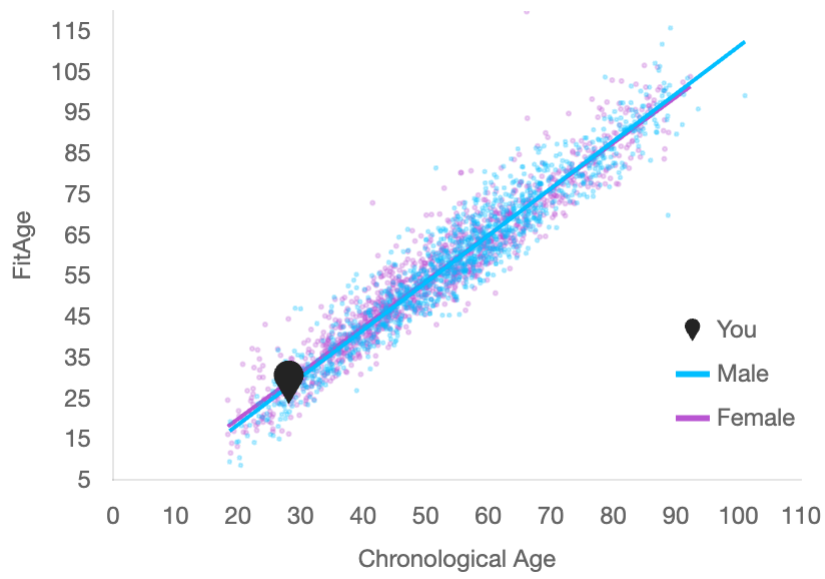
Fit Age

24.6

Younger

-3.6 yr

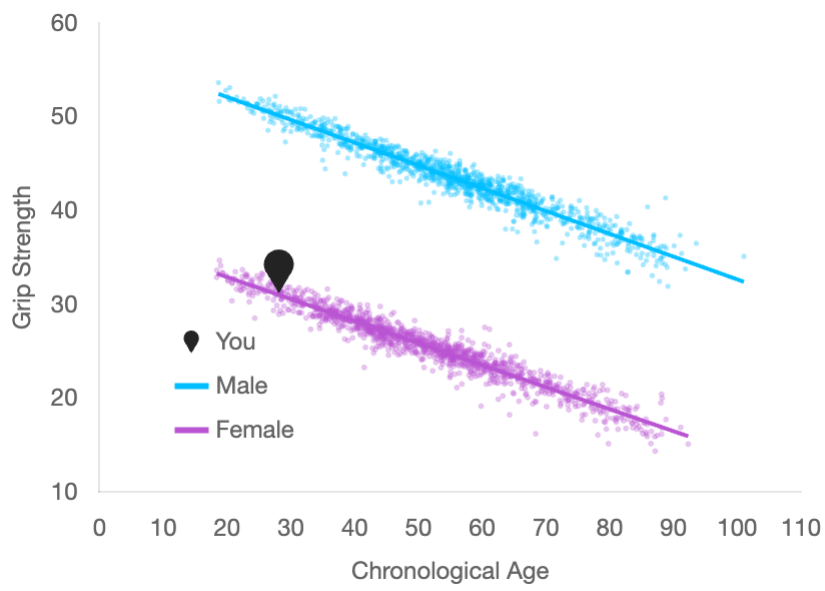
Your FitAge is lower by **3.6 years** compared to people your same age and sex.



Grip Strength Percentile

74.8%

Your Grip Strength is higher than **74.8%** of people of the same age and sex.



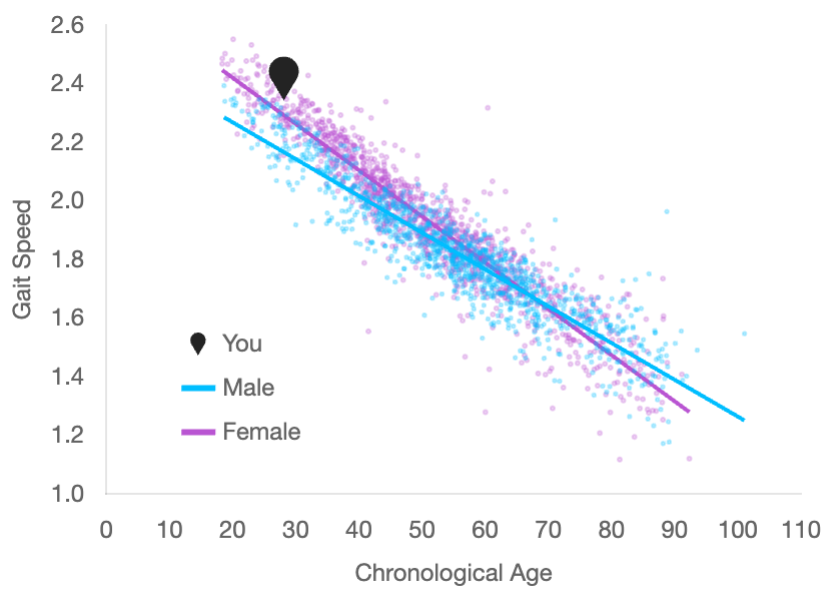
DISCLAIMER: The population graph and percentile are based on observed and validated data patterns from an equal distribution of Harvard research participants and TruDiagnostic clients to emulate a population of average health. These are our least correlated clocks but can be used for most to gamify fitness.

Gait Speed Percentile

76.7% ☺

Your Gait Speed is higher than **76.7%** of people of the same age and sex.

Gait speed, also known as walking speed, is measured in meters per second.

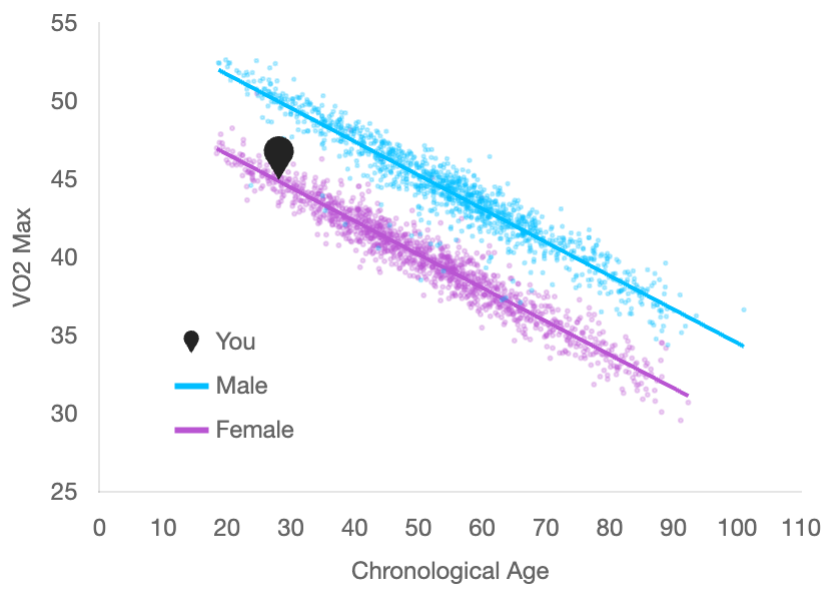


VO2 Max Percentile

67.8% ☺

Your VO2 Max is higher than **67.8%** of people of the same age and sex.

Maximal oxygen uptake, or VO2max, is a measure of cardiovascular health and aerobic endurance.

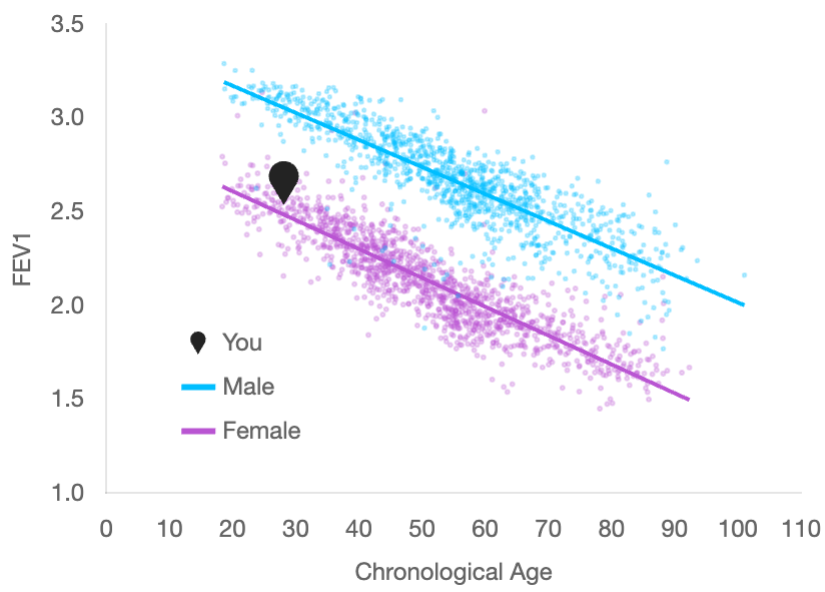


FEV1 Percentile

70.7% ☺

Your FEV1 is higher than **70.7%** of people of the same age and sex.

Forced expiratory volume, also known as FEV1, measures lung function by determining the amount of air forced from the lungs in one second.



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Relative **Smoking Risk**

Tobacco Smoking Epigenetic Predictor Low Risk 3.4%

High Risk	80+
Intermediate Risk	70 - 80
Low Risk	0 - 70

Relative **Alcohol Risk**

Alcohol Epigenetic Biomarker Low Risk 51.1%

High Risk	80+
Intermediate Risk	70 - 80
Low Risk	0 - 70

Additional Epigenetic Biomarkers

Albumin

Normal

20 — 100

28.9%

Function

Albumin: A protein in the blood that helps maintain oncotic pressure and transport substances.

Recommendations

- If applicable, consume high-proten foods
- Diversify protein sources
- Consider vitamin D and omega-3-rich foods or supplements.
- Manage liver and kidney health
- Limit nephrotoxic medications

Vitamin D | Omega-3 Fatty Acids | Lean meats | Poultry | Fish | Eggs | Dairy | Legumes | Nuts

Hemoglobin

Normal

20 — 100

62.4%

Function

Hemoglobin: A protein in red blood cells that carries oxygen; critical for evaluating oxygen transport and anemia.

Recommendations

- Correct nutrient deficiencies, especially folate, iron, B12, and vitamin C.
- Consider EPO in the setting of CKD
- Manage chronic conditions
- Stay active and hydrated

Vitamin B12 | Folate | Iron | Vitamin C | Leafy green vegetables | Citrus fruits | Legumes | Eggs

HbA1c

Normal

0 — 80

13.9%

Function

HbA1c: Glycated hemoglobin; indicates average blood sugar levels over the past 2–3 months.

Recommendations

- Consume low-glycemic balanced meals
- Exercise regularly
- Pursue weight loss if applicable
- Reduce sugar intake
- Manage stress
- Consider medications if advised by your physician
- Consider supplements like ALA, berberine, or dihydroberberine

Alpha Lipoic Acid | Berberine | Dihydroberberine | Lean proteins | Healthy fats | Fiber-rich foods

Hematocrit

Normal

20 — 100

46.8%

Function

Hematocrit: Percentage of red blood cells in blood; used to assess anemia and hydration.

Recommendations

- Correct nutrient deficiencies, especially folate, iron, B12, and vitamin C
- Treat illness
- Stay active and hydrated

Vitamin B12 | Folate | Iron | Vitamin C | Leafy green vegetables | Citrus fruits | Legumes | Eggs

Additional Epigenetic Biomarkers

Blood Urea Nitrogen

Normal

41.9%

Function

Blood Urea Nitrogen (BUN): Measures urea levels in the blood, indicating kidney function and protein metabolism.

Recommendations

- Hydrate regularly
- If applicable, moderate protein intake
- Manage any kidney or liver disease
- Avoid nephrotoxic drugs

Alkaline Phosphatase

Normal

1.0%

Function

Alkaline Phosphatase: An enzyme found in the liver, bones, and other tissues; elevated levels indicate liver or bone issues.

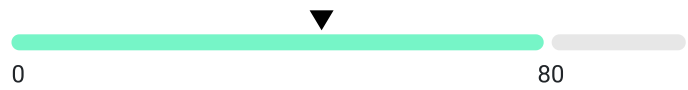
Recommendations

- Correct Vitamin D deficiency
- Treat liver or bone disease if applicable
- Eat a diet low in saturated fats
- Exercise regularly
- Avoid alcohol and toxins

Vitamin D

Insulin-like Growth Factor-Binding Protein 2

Normal



46.3%

Function

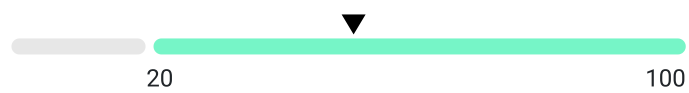
Insulin-Like Growth Factor-Binding Protein 2 (IGFBP2): Regulates insulin-like growth factor activity; linked to metabolism and aging.

Recommendations

- Regularly practice calorie restriction under healthcare provider guidance
- Engage in aerobic and resistance exercise to improve insulin sensitivity
- Consume balanced meals
- Manage stress
- Reduce excessive protein intake
- Improve sleep to support growth hormone function

Carboxypeptidase B2

Normal



51.1%

Function

Carboxypeptidase B2: An enzyme involved in clot dissolution and complement regulation.

Recommendations

- Consume adequate protein
- Correct any nutrient deficiencies, especially vitamin K and omega-3
- Control inflammation through an anti-inflammatory diet and regular exercise

Omega-3 Fatty Acid Vitamin K

Additional Epigenetic Biomarkers

Ribonuclease pancreatic

Normal

0 80

54.3%

Function

Ribonuclease Pancreatic: An enzyme that degrades RNA; linked to digestive and cellular processes.

Recommendations

- Consider an anti-inflammatory diet
- Regulate blood sugar levels
- Manage stress
- Maintain an active lifestyle

Omega-3 Fatty Acid | Anti-inflammatory diet

Inter-alpha-trypsin Inhibitor Heavy Chain H3

Normal

0 80

21.3%

Function

Inter-Alpha-Trypsin Inhibitor Heavy Chain H3: A protein involved in inflammation and tissue repair.

Recommendations

- Identify and control sources of inflammation, especially insulin resistance, gut microbiome imbalances, dietary factors, lipids, toxins, autoimmunity, and environmental exposures
- Maintain an active lifestyle
- Consider an anti-inflammatory diet

Anti-inflammatory diet

Fasting Glucose

Normal

0 80

32.9%

Function

Glucose: Blood sugar level; essential for assessing metabolic health and diagnosing diabetes.

Recommendations

- Control carbohydrated intake when applicable
- Stay active
- Manage weight
- Avoid sugar
- Manage stress
- Consider medications if advised by your physician
- Consider supplements like ALA, berberine, or dihydroberberine

Alpha Lipoic Acid | Berberine | Dihydroberberine | Lean proteins | Healthy fats | Fiber-rich foods

Ribitol

Normal

0 80

49.4%

Function

Ribitol: A sugar alcohol; involved in pentose phosphate and metabolic pathways.

Recommendations

- Limit sugar and high glycemic food intake
- Consider monitoring blood sugar

Lean protein | Low fat dairy

Additional Epigenetic Biomarkers

Creatinine

Normal

0 — 80 — 48.6%

Function

Creatinine: A byproduct of muscle metabolism; used to evaluate kidney function.

Recommendations

- Hydrate regularly
- If applicable, reduce red meat intake
- Control diabetes and hypertension
- Avoid nephrotoxic drugs
- Note that creatine can affect this level

Phenylacetylglutamine

Normal

0 — 80 — 31.8%

Function

Phenylacetylglutamine: A gut microbiome-derived metabolite of phenylalanine; linked to kidney function.

Recommendations

- Balance protein intake
- Limit foods high in phenylalanine (e.g, processed foods, dairy, meat, and some grains)
- Stay hydrated
- Monitor liver and kidney function
- Consider prebiotics or probiotics for gut health

Prebiotics | Probiotics

Uridine

Normal

20 — 100 — 93.2%

Function

Uridine: A nucleoside involved in RNA synthesis and energy metabolism.

Recommendations

- Incorporate uridine-rich foods like tomatoes, broccoli, and mushrooms, which are synergistic with choline and DHA

Uridine | Choline | DHA | Tomatoes | Broccoli | Mushrooms | Eggs | Fatty fish

1-margaroyl-glycerophospholipid(GPE)(17:0)*

Normal

0 — 80 — 42.1%

Function

1-Margaroyl-Glycerophospholipid (GPE) (17:0): A glycerophospholipid; essential for cell membrane stability.

Recommendations

- If applicable, reduce saturated fat intake
- Increase omega-3 intake
- Consider anti-inflammatory agents like curcumin or green tea extract

Omega-3 Fatty Acid | Curcumin | Green tea extract | Green tea

Additional Epigenetic Biomarkers

4-Methoxyphenol Sulfate

Normal

0 80

66.7%

Function

4-Methoxyphenol Sulfate: A sulfated metabolite of phenolic compounds; reflects detoxification processes.

Recommendations

- Avoid woodsmoke exposure and dark-aged beer
- Avoid synthetic fragrances

N-acetyl-isoputreanine

Normal

0 80

69.3%

Function

N-Acetyl-Isoputreanine: A metabolite of polyamine biosynthesis; associated with cellular growth and repair.

Recommendations

- Consider NAC supplementation

NAC

Gluconate

Normal

0 80

24.4%

Function

Gluconate: A metabolite of glucose; involved in carbohydrate metabolism and energy production.

Recommendations

- Cut added sugar, added fat, and processed foods
- Exercise regularly
- Consider ALA, berberine, or dihydroberberine
- Limit wine

Alpha Lipoic Acid | Berberine | Dihydroberberine

Carotene Diol

Normal

20 100

62.1%

Function

Carotene Diol: A carotenoid metabolite; an antioxidant linked to vitamin A activity. Important for eye and brain health.

Recommendations

- Consume more carotenoid-rich foods like carrots, kale, and spinach

Carrots | Kale | Spinach

Additional Epigenetic Biomarkers

4-hydroxyphenylacetylglutamine

Normal

0 — 80 — 77.8%

Function

4-Hydroxyphenylacetylglutamine: A gut microbial metabolite of tyrosine; linked to gut health and kidney function.

Recommendations

- Manage blood pressure
- If applicable, reduce protein intake
- Increase fiber and fermented foods
- Consider prebiotics or probiotics
- Stay hydrated
- Protect kidney health

Prebiotics | Probiotics | Kefir | Yogurt | Sauerkraut | Fiber-rich foods

Androsterone Sulfate

Normal

20 — 100 — 89.9%

Function

Androsterone Sulfate: A steroid hormone metabolite downstream of testosterone; reflects androgen activity and metabolism.

Recommendations

- Correct any nutrient deficiencies, especially zinc, magnesium, vitamin D, and omega-3
- Optimize sleep
- Manage stress
- Consider hormone therapy if needed
- Maintain an active lifestyle

Zinc | Magnesium | Vitamin D | Omega-3 | DHEA

3-Ureidopropionate

Normal

0 — 80 — 41.7%

Function

3-Ureidopropionate: A product of pyrimidine metabolism; involved in nitrogen recycling.

Recommendations

- If applicable, reduce excessive protein intake, especially those rich in pyrimidines like organ meats
- Stay hydrated
- Monitor kidney and liver health

Bone Morphogenetic protein 1

Normal

20 — 100 — 54.3%

Function

Bone Morphogenetic Protein 1 (BMP1): A protein involved in bone formation and extracellular matrix remodeling.

Recommendations

- Consume calcium-rich and vitamin D-rich foods
- Consider calcium or vitamin D supplementation
- Increase weight-bearing exercise
- Ensure adequate protein intake

Calcium | Vitamin D | Green leafy vegetables | Nuts | Dairy | Fatty fish

Additional Epigenetic Biomarkers

Versican core protein

Normal

47.3%

Function

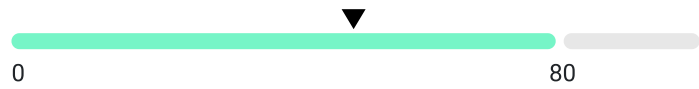
Versican Core Protein: A proteoglycan in the extracellular matrix; involved in tissue remodeling and inflammation.

Recommendations

- Avoid being underweight
- Increase moderate-intensity exercise

Cystine

Normal



50%

Function

Cystine: A disulfide form of cysteine; indicates oxidative stress and protein turnover.

Recommendations

- Avoid excessive methionine-rich protein sources like eggs, dairy, certain nuts, and seeds
- Stay hydrated
- Increase vitamins B6, B9, and B12 to support homocysteine metabolism

Vitamin B6 | Vitamin B9 | Vitamin B12

Mimecan

Normal

34.7%

Function

Mimecan (Osteoglycin): A small leucine-rich proteoglycan; involved in bone mineralization and cardiovascular health.

Recommendations

- Consider an anti-inflammatory diet
- Manage stress
- Maintain an active lifestyle
- If applicable, manage underlying cardiovascular or fibrotic conditions
- Monitor blood pressure and cholesterol

Omega-3 Fatty Acid

Histone H2B type 1-K

Normal

25.5%

Function

Histone H2B Type 1-K: A histone protein involved in chromatin structure and epigenetic regulation.

Recommendations

- Limit UV exposure
- Increase antioxidant intake
- Avoid smoke exposure
- Manage stress
- Maintain an active lifestyle

Additional Epigenetic Biomarkers

1-Stearoyl-2-adrenoyl-GPC (18:0/22:4)* Normal

23.9%

Function

A glycerophosphocholine (GPC) lipid, this compound supports membrane integrity, brain function, and lipid metabolism, essential for longevity. Low levels may impair neuroprotection, increase oxidative stress, and accelerate age-related decline.

Recommendations

- If applicable, correct omega-3 deficiency
- Increase antioxidants
- Limit alcohol

Omega-3 Fatty Acid | Flaxseeds | Walnuts | Fatty fish

Red Blood Cell Distribution Width Normal

37.9%

Function

Red Blood Cell Width (RDW): Measures the variation in red blood cell size.

Recommendations

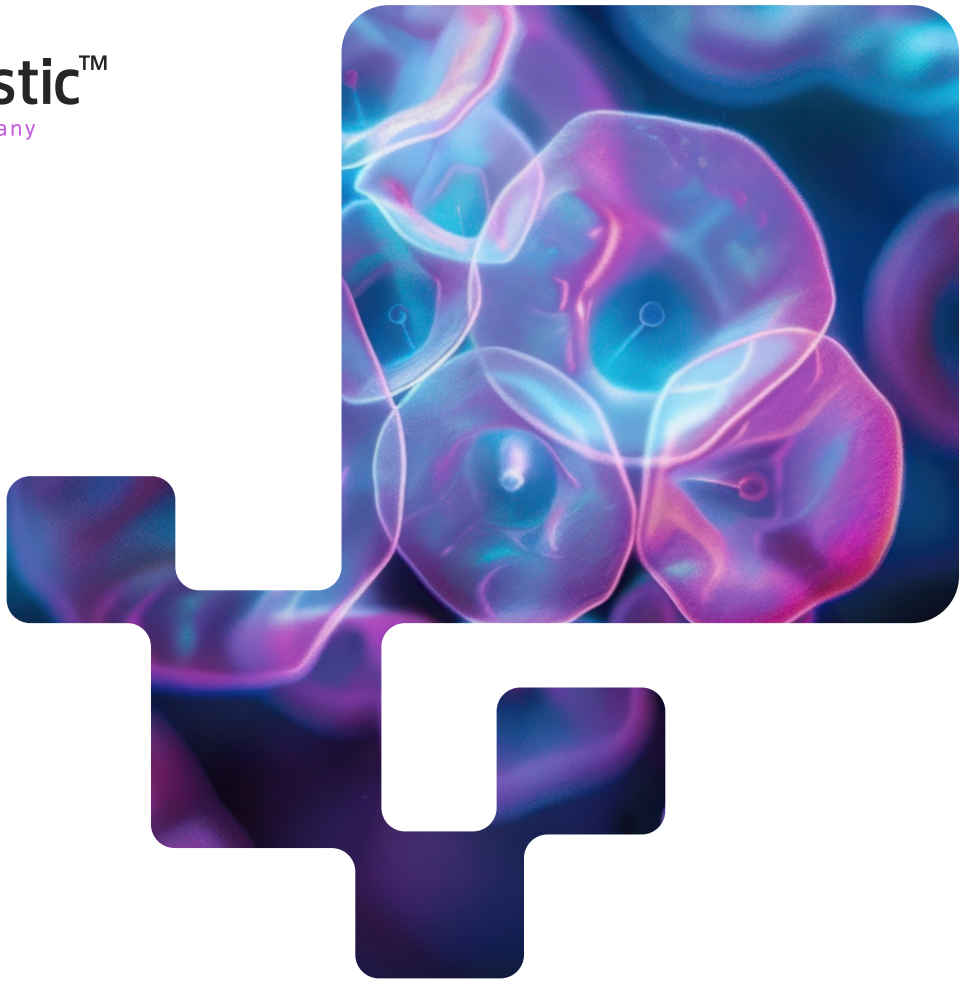
- Correct nutrient deficiencies, especially B12, folate, iron, and vitamin C
- Manage chronic illness and inflammation
- Consider omega-3s
- Avoid alcohol and smoking

Vitamin B12 | Folate | Iron | Vitamin C | Omega-3 Fatty Acids

Red meat | Beans | Fortified cereals | Dairy | Meat

Leafy green vegetables | Citrus fruits | Tomatoes | Peppers

TruDiagnostic™
The Epigenetic Company



TruHealth Report

Jane Doe

Age: 29 | Sex: Female

ID#: VBC43XM

Collected: 06/06/2025 | Reported: 06/11/2025

Fasted: Unknown

CLIA Lab Director: Melissa Keinath, PhD FACMG
TruDiagnostic
881 Corporate Drive
Lexington, KY 40503

Welcome to your personalized report on **Epigenetic Biomarkers**

What are Epigenetic Biomarkers?

Epigenetic biomarkers are specific biological markers derived from analyzing DNA methylation patterns in your genome. Unlike traditional blood-based metrics of your health such as serum levels, which provide a single snapshot in time, epigenetic biomarkers uniquely offer insights into ongoing biological functions by predicting levels of nutrients, metabolites, and other essential biochemical entities. These epigenetic measurements are based on patterns in your DNA methylation landscape, influenced by both genetic and environmental factors. Epigenetic biomarkers provide a more stable and comprehensive view of your health over time, reflecting long-term exposures and trends rather than short-term fluctuations.

Epigenetic Biomarkers vs Serum Levels

Serum levels represent a direct measurement of substances in your blood at a specific point in time. These levels can vary based on recent meals, exercise, stress, and other transient factors. In contrast, epigenetic biomarkers are derived from DNA methylation patterns, providing a broader and more consistent indication of health, which isn't as influenced by short-term changes. This makes epigenetic biomarkers especially useful for understanding long-term health trends and risks.

Epigenetic biomarkers provide a more stable and comprehensive view of your health over time, reflecting long-term exposures and trends rather than short-term fluctuations.

The Reference Cohort: The Data Behind TruHealth's Analytics

Our algorithms and biomarkers are developed and validated using data from a subset of the Massachusetts General Brigham (MGB) Biobank. The MGB Biobank is a comprehensive repository containing over 130,000 high-quality samples from more than 100,000 consented patients. These samples are linked to detailed EMR data, which includes the patients' lifetime medical histories. The biobank also incorporates survey data on lifestyle, environment, and family history. To ensure meaningful percentile comparisons in your report, we used an equal combination of data from the MGB Biobank and TruDiagnostic patients, providing a robust, diverse, and extensively studied reference population.

Biomarkers Overview

This section of the TruHealth report provides a comprehensive overview of an individual's general health and nutrition markers, each derived from one or more epigenetic biomarkers that reflect underlying cellular health and function. These markers are presented in a normalized percentile range, allowing for a straightforward comparison with a reference population. A score of 0 indicates the worst outcome, representing potential areas of concern or risk, while a score of 100 signifies the best possible outcome, highlighting areas of optimal health. The percentile ranking provides an easy-to-interpret indication of how an individual's health status compares to the broader population, offering valuable insights into their relative standing in terms of metabolic health, immune function, inflammation, mitochondrial activity, and more. This comparison against a carefully studied cohort gives context to these markers, enabling users to understand areas where they may need intervention or where they are already performing well.

NUTRITION

Vitamins	61%
Amino Acids	58%
Antioxidants	54%
Fats and Cellular Membranes	63%

GENERAL HEALTH MARKERS

Lipid Peroxidation		69%
Serum Lipids		81%
Blood Pressure		49%
Metabolic Markers		75%
Immune Markers		69%
Neurocognitive Markers		48%
Inflammation Markers		77%
Stress Markers		56%
Toxins	Suboptimal	33%
Uric Acid Pathway		63%
Mitochondrial Function		42%
Oxidative Defense		68%
NAD+ Metabolism		77%
Ketones		83%
Supplements		41%

TOP PERSONALIZED RECOMMENDATIONS

VITAMINS

Vitamin C

Consume foods high in Vitamin C.

Vitamin C

NEUROCOGNITIVE MARKERS

Brain Inflammation Marker

Adjust Brain Inflammation Marker levels through diet and lifestyle changes.

VITAMINS

Vitamin C

Consume foods high in Vitamin C.

Vitamin C

BLOOD PRESSURE

Vanilla Acetic Acid (VAA)

Adjust Vanilla Acetic Acid (VAA) levels through diet and lifestyle changes.

FATS AND CELLULAR MEMBRANES

LA

Adjust LA levels through diet and lifestyle changes.

AMINO ACIDS

Cystathionine

Adjust Cystathionine levels through diet and lifestyle changes.

EPIGENETIC BIOMARKERS **RISK SCORES**

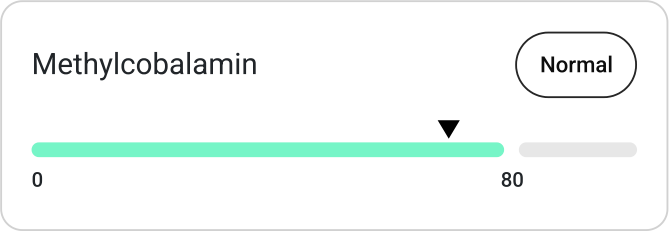
The **Epigenetic Biomarkers Risk Scores** section of the report provides a detailed breakdown of specific **epigenetic biomarkers** derived from your epigenome, each linked to relevant **risk scores** and associated **biomarkers**. Every epigenetic biomarker is accompanied by a concise explanation of its function in the body and its relationship to disease or health outcomes. The **optimal and suboptimal ranges** for these biomarkers vary, depending on whether the biomarker is most beneficial at **high, low, or midrange levels**. For biomarkers identified as suboptimal, personalized **lifestyle** and **supplement recommendations** are provided for improvement. Additionally, prior epigenetic biomarker values are displayed to **track changes over time**, offering insight into progress and areas that may need continued attention.

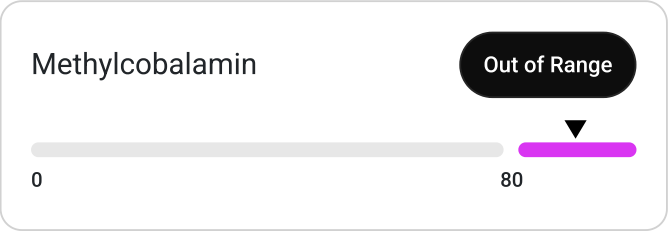
There are Three Different Ranges for Each Epigenetic Biomarkers (EB)

In the below section, each epigenetic biomarker will be presented as your percentile when compared against the reference population. Each epigenetic biomarker is identified by our science team as ideal when LOW, MIDDLE, or HIGH. When the ideal biomarker is thought to be LOW, a percentile of 0% is best. When the MIDDLE is ideal, 50% is best. When HIGH is ideal, 100% is best.

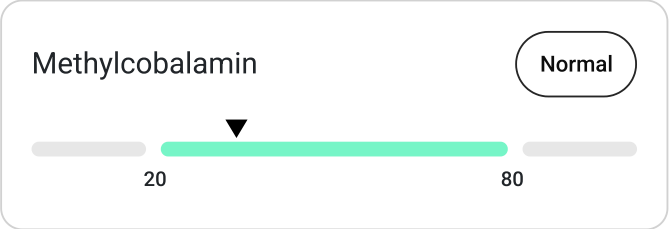
Normal Out of Range ⚠ Critically Out of Range

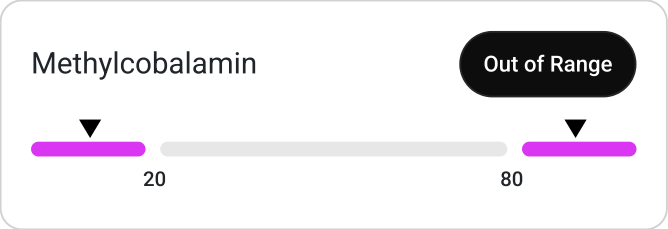
Example: Normal Range is **LOW**



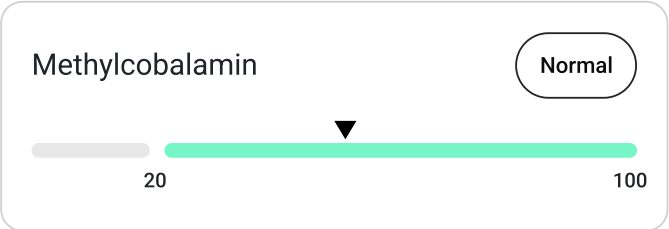


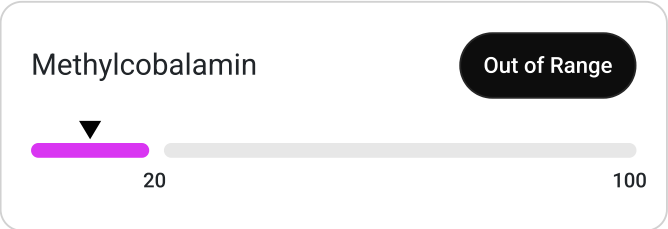
Example: Normal Range is **MIDDLE**





Example: Normal Range is **HIGH**





VITAMINS

Vitamin A$_m$

Retinol (vitamin A)$_m$

90%

Description

Retinol (Vitamin A) is essential for vision, immune function, and cellular communication.

Vitamin B2 (Riboflavin)$_m$

Riboflavin (vitamin B2)$_m$

26%

Description

A B-vitamin essential for energy production and cellular function

Vitamin B3 (Nicotinamide)$_m$

Nicotinamide$_m$

52%

Description

Nicotinamide is a form of vitamin B3, essential for NAD+ production and cellular energy. Low levels are associated with lower NAD+ production, and high levels are associated with inhibition of Sirtuins and NAD+ recycling pathways.

Vitamin B5 (Pantothenic Acid)$_m$

Pantothenic Acid (vitamin B5)$_m$

67%

Description

Pantothenic Acid (Vitamin B5) is essential for CoA synthesis and energy metabolism.

Vitamin B6 (P5P)$_m$

Pyridoxine, Pyridoxine-5-Phosphate (vitamin B6)$_m$

10%

Description

Pyridoxine (Vitamin B6) is a coenzyme in amino acid metabolism and neurotransmitter synthesis.

Vitamin B8 (Inositol)$_m$

Inositol (myoinositol)$_m$

46%

Description

Inositol is a carbohydrate involved in cell membrane formation and insulin signal transduction.

Vitamin C$_m$

Ascorbic acid 2-sulfate$_m$

6%

Description

Sulfated form of Vitamin C.

Vitamin C$_m$

Ascorbic acid 3-sulfate$_m$

5%

Description

Another sulfated form of Vitamin C.

Vitamin D$_m$

Cholecalciferol (vitamin D)$_m$

63%

Description

A form of Vitamin D; important for bone health and immune function.

Vitamin E$_m$

Alpha-tocopherol$_m$

51%

Description

A form of Vitamin E with strong antioxidant properties. High levels can be associated with reduced gamma-tocopherol function, and low levels can be associated with poor antioxidant function.

Choline$_m$

Total cholines$_m$

78%

Description

Essential nutrient involved in brain health and fat metabolism.

Betaine$_m$

43%

Description

A methyl donor involved in liver function and cell hydration.

AMINO ACIDS

Methionine$_m$

59%

Description

An essential amino acid involved in protein synthesis and detoxification processes.

Cysteine$_m$

54%

Description

Amino acid involved in protein synthesis and antioxidant functions

---

S-methylmethionine$_m$

S-Methylmethionine$_m$

54%

Description

A methylated form of methionine involved in methylation reactions

---

Taurine$_m$

41%

Description

A sulfur-containing amino acid with antioxidant properties.

Ergothioneine$_m$

88%

Description

Ergothioneine is a powerful antioxidant involved in cellular protection and oxidative stress regulation. High levels may reflect increased oxidative stress or enhanced antioxidant activity, while low levels could indicate reduced cellular defense against oxidative damage.

Glutamine$_m$

78%

Description

An amino acid essential for gut health.

Arginine$_m$

90%

Description

An amino acid involved in protein synthesis and nitric oxide production.

Tyrosine$_m$

46%

Description

An amino acid involved in protein synthesis and a precursor to neurotransmitters such as dopamine and norepinephrine.

L-Aspartic Acid$_m$

34%

Description

L-Aspartic Acid is a non-essential amino acid important in the urea cycle and energy production. Low levels may impair protein synthesis and neurotransmitter function, while high levels could indicate metabolic stress.

Valine$_m$

N-carbamoylvaline$_m$

26%

Description

N-carbamoylvaline is a derivative of valine, playing a role in nitrogen metabolism. Abnormal levels might indicate stress on nitrogen metabolism from diet or inflammation.

Asparagine$_m$

81%

Description

An amino acid involved in metabolic processes.

Threonine$_m$

N-acetylthreonine$_m$

15%

Description

N-acetylthreonine is an acetylated derivative of threonine, essential for protein production. Low levels could impair immune function and recovery, while high levels might suggest dietary imbalances.

Valine$_m$

N-acetylvaline$_m$

65%

Description

N-acetylvaline is involved in valine metabolism, an essential amino acid. Low levels could affect muscle recovery, while high levels could reflect metabolic stress.

Glycine$_m$

95%

Description

An amino acid involved in detox and sleep.

Carnosine$_m$

N-acetylcarnosine$_m$

15%

Description

A derivative of carnosine, which acts as an antioxidant in the body.

Cystathionine$_m$

8%

Description

Intermediate in methionine metabolism and cysteine biosynthesis

---

Histidine$_m$

N-acetylhistidine$_m$

28%

Description

A derivative of histidine, important for metal ion binding and antioxidant functions. Low levels could affect muscle recovery, while high levels may indicate inflammation or stress.

Citrulline$_m$

42%

Description

Non-essential amino acid involved in nitric oxide production and vascular health.

ANTIOXIDANTS

Carotenoids$_m$

Lutein$_m$

98%

Description

A carotenoid with antioxidant properties, found in green leafy vegetables.

Carotenoids$_m$

Carotene diol$_m$

78%

Description

Carotenoid found in plants; antioxidant properties.

Acetyl-L-Carnitine$_m$

15%

Description

Acetyl-L-Carnitine is a compound involved in fatty acid metabolism and mitochondrial energy production. Elevated levels may indicate increased energy demand or metabolic adaptation, while low levels could suggest impaired mitochondrial function or reduced fatty acid utilization.

Vitamin A$_m$

Retinol (vitamin A)$_m$

90%

Description

Retinol (Vitamin A) is essential for vision, immune function, and cellular communication.

Vitamin E$_m$

Alpha-tocopherol$_m$

51%

Description

A form of Vitamin E with strong antioxidant properties.

Ergothioneine$_m$

88%

Description

Ergothioneine is a powerful antioxidant involved in cellular protection and oxidative stress regulation. High levels may reflect increased oxidative stress or enhanced antioxidant activity, while low levels could indicate reduced cellular defense against oxidative damage.

Vitamin B2 (Riboflavin)$_m$

Riboflavin (vitamin B2)$_m$

26%

Description

A B-vitamin essential for energy production and cellular function

---

Vitamin C$_m$

Ascorbic acid 2-sulfate$_m$

6%

Description

A sulfated form of Vitamin C.

Vitamin C$_m$

Ascorbic acid 3-sulfate$_m$

5%

Description

Another sulfated form of Vitamin C.

FATS AND CELLULAR MEMBRANES

Omega 3$_m$

Omega-3$_m$

59%

Description

Omega-3 is a polyunsaturated fatty acid with essential roles in reducing inflammation and supporting heart, brain, and joint health. High levels may indicate adequate dietary intake, while low levels could suggest poor dietary consumption or increased risk of inflammatory conditions.

DHA$_m$

Docosahexaenoate (DHA; 22:6n3)$_m$

86%

Description

An omega-3 fatty acid that plays a key role in brain health and inflammation.

DPA$_m$

Docosapentaenoic acid$_m$

54%

Description

A lesser-known omega-3 fatty acid involved in inflammatory processes.

EPA$_m$

Eicosapentaenoate (EPA; 20:5n3)$_m$

79%

Description

An omega-3 fatty acid with anti-inflammatory effects, found in fish oils.

Omega 6$_m$

Omega-6$_m$

18%

Description

Omega-6 is a polyunsaturated fatty acid involved in cell function and inflammation regulation. High levels may indicate excessive intake of processed foods or an imbalance with omega-3, potentially promoting inflammation. Low levels could suggest insufficient dietary intake or impaired fat metabolism.

LA$_m$

92%

Description

Linoleic Acid (LA) is an essential omega-6 polyunsaturated fatty acid critical for cell membrane integrity and inflammatory processes. Excessive LA intake may promote lipid peroxidation and chronic inflammation, potentially negatively affecting metabolic health and longevity.

PUFA$_m$

84%

Description

Polyunsaturated Fatty Acids (PUFAs) are essential fats involved in cell structure and inflammation regulation. Excessive omega-6 PUFA intake may promote lipid peroxidation, leading to oxidative stress and inflammation, which could negatively impact longevity and metabolic health.

MUFA$_m$

13%

Description

Monounsaturated Fatty Acids (MUFAs) are healthy fats with a single double bond, involved in maintaining cell membrane fluidity and supporting cardiovascular health. MUFAs may reduce inflammation and oxidative stress, potentially benefiting metabolic health and longevity.

SFA$_m$

53%

Description

Saturated Fatty Acids (SFAs) are fats with no double bonds, commonly found in animal products and some plant oils. High intake of SFAs can increase cholesterol levels and may promote inflammation, potentially impacting cardiovascular health and longevity when consumed in excess.

Pentadecanoate$_m$

Pentadecanoate (C15:0)$_m$

29%

Description

Pentadecanoate (C15:0) is a saturated fatty acid with potential anti-inflammatory properties. High levels may indicate metabolic stress or excessive intake of specific dietary fats, while low levels could suggest impaired fat metabolism.

Phosphoglycerides$_m$

48%

Description

Phosphoglycerides are a class of phospholipids that form a major component of cell membranes, supporting membrane fluidity, signaling, and energy metabolism. Imbalances in phosphoglycerides may disrupt cellular function, potentially affecting metabolic health and longevity.

Phosphatidylcholine$_m$

Phosphatidylcholines$_m$

93%

Description

Phosphatidylcholines are a major class of phospholipids critical for cell membrane structure, lipid transport, and signaling. They support liver function and cognitive health, with imbalances potentially affecting metabolism and longevity.

Sphingomyelins$_m$

86%

Description

Sphingomyelins are a type of sphingolipid essential for cell membrane integrity and signaling, particularly in nerve and brain tissues. Dysregulation of sphingomyelins may contribute to metabolic dysfunction and neurodegenerative diseases, potentially impacting longevity.

LIPID PEROXIDATION

Phospholipase A2$_m$

50%

Description

Phospholipase A2 is an enzyme involved in lipid metabolism and inflammatory regulation. High levels may indicate heightened inflammatory activity or cellular damage, while low levels could suggest impaired lipid signaling or reduced inflammatory response.

Glutathione peroxidase$_m$

Glutathione peroxidase 1 (GPX1)$_m$

64%

Description

Glutathione peroxidase is an enzyme involved in antioxidant defense and cellular protection. Elevated levels may reflect increased oxidative stress or an adaptive response to cellular damage, while low levels could indicate impaired antioxidant capacity and increased vulnerability to oxidative damage.

Octadecadienedioate (C18:2-DC)$_m$

5%

Description

C18:2-DC is a dicarboxylic acid, linked to lipid metabolism and energy regulation. High levels could be linked to metabolic disorders, while low levels may indicate impaired lipid metabolism or energy production.

SERUM LIPIDS

ApoB$_m$

10%

Description

Apolipoprotein B (ApoB) is a structural protein of atherogenic lipoproteins, including LDL and VLDL. Elevated ApoB levels reflect the number of these lipoproteins, providing a stronger predictor of cardiovascular disease risk and atherosclerosis than LDL cholesterol alone, making it crucial for assessing metabolic health and longevity.

LDL-C$_m$

78%

Description

LDL-C (Low-Density Lipoprotein Cholesterol) represents the cholesterol carried by LDL particles, often referred to as “bad cholesterol.” Elevated LDL-C levels are strongly associated with increased risk of atherosclerosis and cardiovascular disease, making it a key marker for assessing cardiovascular health and longevity.

LDL particle size$_m$

78%

Description

Smaller, dense LDL particles are more atherogenic and strongly associated with cardiovascular disease risk, while larger LDL particles are less likely to penetrate arterial walls, indicating a potentially lower risk profile and better metabolic health.

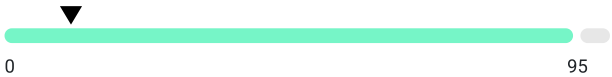
VLDL-C$_m$

26%

Description

VLDL-C (Very-Low-Density Lipoprotein Cholesterol) represents cholesterol carried by VLDL particles, which transport triglycerides from the liver to peripheral tissues. Elevated VLDL-C is associated with increased atherogenic risk, contributing to triglyceride-rich lipoprotein accumulation, cardiovascular disease, and metabolic dysfunction, negatively impacting longevity.

VLDL particle size$_m$



11%

Description

Smaller VLDL particles are more atherogenic and linked to higher cardiovascular risk, while larger particles may indicate improved lipid metabolism and reduced metabolic dysfunction, influencing overall health and longevity.

ApoA1$_m$

91%

Description

Apolipoprotein A1 (ApoA1) is the primary structural protein of HDL particles, playing a key role in reverse cholesterol transport and antioxidant defense. Higher ApoA1 levels are associated with improved cardiovascular health, reduced atherosclerosis risk, and better longevity outcomes through enhanced lipid metabolism and anti-inflammatory effects.

HDL-C$_m$

91%

Description

HDL-C (High-Density Lipoprotein Cholesterol) represents the cholesterol carried by HDL particles, often referred to as “good cholesterol.” Higher HDL-C levels are associated with improved reverse cholesterol transport, reduced cardiovascular disease risk, and better longevity outcomes through anti-inflammatory and antioxidant effects.

HDL particle size$_m$

96%

Description

Larger HDL particles are generally more effective at reverse cholesterol transport and provide stronger antioxidant and anti-inflammatory benefits, contributing to reduced cardiovascular disease risk and improved longevity.

Total triglycerides$_m$

2%

Description

Total triglycerides are the primary form of fat in the blood, stored for energy use in adipose tissue. Elevated levels are associated with insulin resistance, metabolic syndrome, and increased cardiovascular risk, making them a critical marker for assessing metabolic health and longevity.

BLOOD PRESSURE

Vanilla Acetic Acid (VAA)$_m$

Vanilla Acetic Acid$_m$

7%

Description

Vanilla Acetic Acid (VAA) is a metabolite derived from phenylalanine metabolism. Elevated levels of VAA are associated with increased cardiovascular disease (CVD) risk and hypertension (HTN) and may indicate pathways contributing to vascular inflammation, oxidative stress, or hormonal regulation of blood pressure. Conversely, low levels of VAA might reflect insufficient phenylalanine metabolism or altered gut microbiome activity, which could indicate disruptions in metabolic or microbial processes.

Phenylacetylglutamine$_m$

18%

Description

Phenylacetylglutamine (PAG) is a gut-derived metabolite linked to phenylalanine metabolism. Elevated PAG levels are associated with increased cardiovascular and kidney disease risk, systemic inflammation, and reduced longevity.

Systolic Blood Pressure$_m$

Systolic Blood pressure$_m$

50%

Description

Systolic Blood Pressure (SBP) is the pressure in arteries during heartbeats. Elevated SBP is strongly associated with cardiovascular disease, kidney damage, and reduced longevity due to increased vascular strain and systemic inflammation.

METABOLIC MARKERS

HgbA1c$_m$

7%

Description

Measure of blood sugar levels over a period of time, indicative of glucose control.

Glucose$_m$

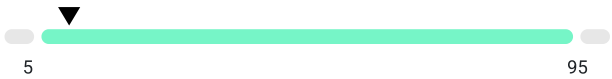
10%

Description

Blood sugar level, related to diabetes risk.

Fat Burning Marker$_m$

Palmitoylcarnitine$_m$



11%

Description

Palmitoylcarnitine plays a role in fatty acid transport into mitochondria for oxidation. High levels can signal impaired fatty acid oxidation, while low levels might affect energy production from fats.

Satiety Hormone$_m$

Leptin$_m$

14%

Description

Leptin is a hormone produced by fat cells that helps regulate appetite and energy balance by signaling the brain to reduce hunger and increase energy expenditure. High levels may indicate leptin resistance and excess body fat, while low levels can suggest insufficient fat reserves or impaired metabolic function.

Phenylalanine Dysbiosis Marker$_m$

Phenylacetylglutamine$_m$

18%

Description

Phenylacetylglutamine (PAG) is a gut-derived metabolite linked to phenylalanine metabolism. Elevated PAG levels are associated with increased cardiovascular and kidney disease risk, systemic inflammation, and reduced longevity.

IMMUNE MARKERS

White Blood Cell Count$_m$

50%

Description

Measures the amount of white blood cells in the blood, important for immune function.

Neutrophil count$_m$

17%

Description

Neutrophil count indicates levels of neutrophils, important for immune defense.

Lymphocyte count$_m$

64%

Description

A type of white blood cell, important for immune system function.

CRP$_m$

15%

Description

Inflammation marker, linked to cardiovascular and chronic diseases

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Neutrophil to lymphocyte ratio (NLR)$_m$

23%

Description

Neutrophil-to-lymphocyte ratio (NLR) is a marker of systemic inflammation and immune balance. High ratios are associated with chronic inflammation, cardiovascular disease, and poor immune regulation, while low ratios may indicate impaired immune response or hematological abnormalities.

Systemic Immune-Inflammation Index (SII)$_m$

23%

Description

Systemic Immune-Inflammation Index (SII) is a composite marker calculated as (Platelet count × Neutrophil count) / Lymphocyte count. High levels are linked to systemic inflammation, poor prognosis in cancer, and cardiovascular risk, while low levels may indicate immune suppression or reduced inflammatory response.

CD4/CD8 Ratio$_m$

49%

Description

The CD4/CD8 ratio reflects the balance between helper and cytotoxic T cells, indicating immune system status. High ratios are linked to autoimmune disorders or chronic inflammation, while low ratios suggest immune suppression, aging, or increased risk of infections and certain cancers.

NEUROCOGNITIVE MARKERS

Memory Health Protein$_m$

Neurogranin$_m$

26%

Description

Neurogranin is a calmodulin-binding protein, linked to synaptic plasticity and cognition. High levels can be linked to neurodegenerative diseases (e.g., Alzheimer's), while low levels might impair synaptic plasticity and cognitive function.

Brain Inflammation Marker$_m$

Quinolinate$_m$

5%

Description

Quinolinate is a metabolite in the kynurenine pathway linked to neuroinflammation. High levels are linked to neurotoxicity and neurodegenerative disorders, while low levels may impair tryptophan metabolism and affect immune function.

Dopamine Metabolites$_m$

Dopamine 3-O-sulfate$_m$

10%

Description

Dopamine 3-O-sulfate is a dopamine metabolite involved in neurotransmitter regulation and detoxification. Elevated levels may indicate altered dopamine metabolism, while low levels could suggest reduced detoxification or neurotransmitter imbalance.

Dopamine Metabolites$_m$

Dopamine 4-sulfate$_m$

60%

Description

Dopamine 4-sulfate is a dopamine metabolite involved in neurotransmitter regulation and detoxification. High levels may indicate altered dopamine metabolism, while low levels could suggest impaired neurotransmitter balance.

Cell Repair Marker$_m$

Transforming growth factor beta (TGF-beta)$_m$

69%

Description

Transforming Growth Factor Beta (TGF-beta) is a cytokine involved in cell growth, proliferation, differentiation, and apoptosis, with key roles in immune regulation and inflammation. Elevated levels may indicate heightened immune activity or chronic inflammation, while low levels could suggest impaired cellular signaling or immune response.

Brain Anti-inflammatory Protein$_m$

Progranulin$_m$

56%

Description

Progranulin is a protein involved in wound healing, inflammation, and neurodegeneration. Elevated levels may reflect active inflammation or tissue repair, while low levels could indicate impaired healing processes or an increased risk of neurodegenerative conditions.

INFLAMMATION MARKERS

IL-6$_m$

21%

Description

IL-6 (Interleukin-6) is a cytokine involved in inflammation and the immune response.

Oxidative Stress Marker$_m$

Methionine sulfone$_m$

54%

Description

An oxidized form of methionine, a marker of oxidative stress. High levels may indicate excessive oxidative stress or impaired sulfur amino acid metabolism, while low levels could affect protein synthesis and antioxidant production.

Serum amyloid A-1 protein$_m$

9%

Description

Serum Amyloid A-1 Protein is an acute-phase protein involved in inflammation and immune response. Elevated levels may indicate active inflammation, while low levels could reflect a lack of inflammatory activity.

Glycoprotein acetyls$_m$

15%

Description

Glycoprotein acetyls (GlycA) are inflammatory biomarkers representing glycosylated acute-phase proteins in the bloodstream. Elevated GlycA levels are associated with systemic inflammation, increased cardiovascular disease risk, and poorer metabolic health, making it a key marker for assessing longevity and chronic disease burden.

CRP$_m$

15%

Description

Inflammation marker, linked to cardiovascular and chronic diseases

STRESS MARKERS

Cortisol$_m$

26%

Description

Cortisol is the primary stress hormone, regulating metabolism and immune response. Elevated levels may indicate chronic stress or metabolic imbalance, while low levels could suggest adrenal insufficiency or impaired stress response.

Chronic Stress Marker$_m$

Kynurenine$_m$

16%

Description

Kynurenine is a metabolite of tryptophan, involved in immune modulation and neurobiology. High levels are associated with inflammation and neurodegenerative diseases, while low levels may indicate impaired tryptophan metabolism.

Adrenal Activity Marker$_m$

Vanilmandelic Acid (VMA)$_m$

30%

Description

VMA is a metabolite of catecholamines (epinephrine and norepinephrine), and high levels are linked to catecholamine excess, while low levels might indicate adrenal insufficiency or low catecholamine turnover.

TOXINS

PFAS (Forever Chemicals)$_m$

Perfluorooctanesulfonate (PFOS)$_m$

80%

Description

PFOS is a synthetic chemical found in industrial and consumer products, including nonstick cookware, water-repellent fabrics, and stain-resistant treatments.

PFAS (Forever Chemicals)$_m$

Perfluorooctanoate (PFOA)$_m$

80%

Description

Perfluorooctanoate (PFOA) is a synthetic chemical used in the production of nonstick cookware, waterproof fabrics, and certain industrial processes.

Acrolein (Pollution and Smoking)$_m$

S-(3-hydroxypropyl)mercapturic acid (HPMA)$_m$

77%

Description

HPMA is a metabolite involved in the detoxification of chemicals like acrolein, found in cigarette smoke, exhaust fumes, and industrial emissions.

Polycyclic aromatic hydrocarbons (Air Pollution)$_m$

2-hydroxyfluorene sulfate$_m$

74%

Description

2-Hydroxyfluorene sulfate is a metabolite that indicates exposure to polycyclic aromatic hydrocarbons (PAHs), which are found in tobacco smoke, grilled or charred foods, and industrial emissions.

Pesticides$_m$

Glyphosate$_m$

60%

Description

Glyphosate is a broad-spectrum herbicide commonly used to control weeds, known for its role in agricultural practices but controversial due to potential health and environmental risks.

Lead Exposure$_m$

Bone Lead Predictor$_m$

29%

Description

This measure reflects long-term lead accumulation in the body, particularly within the skeleton, which stores lead for decades. Elevated levels can be associated with chronic health risks, including hypertension and cognitive decline, due to lead's prolonged presence in bone tissue and periodic release into the bloodstream.

URIC ACID PATHWAY

Uric Acid$_m$

Urate$_m$

13%

Description

Uric acid is an antioxidant byproduct of purine metabolism. High levels may indicate risk for gout, CVD, HTN, and metabolic disorders, while low levels could reduce antioxidant defense and increase oxidative stress.

Xanthine$_m$

2%

Description

Xanthine is a purine metabolite involved in nucleotide breakdown. Elevated levels may indicate oxidative stress or impaired purine metabolism, potentially contributing to inflammation and reduced longevity.

Allantoin$_m$

35%

Description

Allantoin is a purine metabolite formed from the oxidation of uric acid. Elevated levels may indicate oxidative stress, potentially linked to inflammation, tissue damage, and reduced longevity. In humans, it serves as a marker of increased ROS activity rather than a precursor to uric acid

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MITOCHONDRIAL FUNCTION

Energy Balance Marker$_m$

Dynamin-1-like protein (DRP1)$_m$

60%

Description

DRP1 is a protein involved in mitochondrial fission, crucial for cellular energy production and regulation of apoptosis. Elevated levels are linked to mitochondrial fission and could contribute to mitochondrial dysfunction

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ATP synthase (Enzyme)$_m$

ATP synthase subunit beta (ATP5B)$_m$

58%

Description

A component of the mitochondrial ATP synthase complex, high levels are associated with cellular stress and mitochondrial dysfunction.

Energy Transport Protein$_m$

Electron transfer flavoprotein subunit alpha (ETFα)$_m$

23%

Description

Involved in mitochondrial fatty acid oxidation. Low levels could impair fatty acid oxidation, while high levels may indicate abnormal energy metabolism.

OXIDATIVE DEFENSE

Myeloperoxidase (MPO)$_m$

8%

Description

An enzyme released during inflammation and used as a marker for oxidative stress.

Oxidative Damage Marker$_m$

Allantoin$_m$

35%

Description

Allantoin is formed through oxidation of uric acid and thus serves as a marker of oxidative stress. Higher levels of allantoin in the blood increased oxidative stress, inflammation, or other stress-related metabolic disturbances.

Oxidative Stress Indicator$_m$

Methionine sulfone$_m$

54%

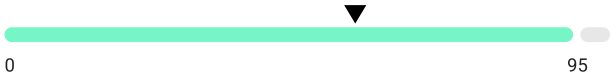
Description

An oxidized form of methionine, a marker of oxidative stress. High levels may indicate excessive oxidative stress or impaired sulfur amino acid metabolism, while low levels could affect protein synthesis and antioxidant production.

NAD+ METABOLISM

Byproduct marker (indicates inefficiency in NAD recycling)$_m$

N1-methyl-2-pyridone-5-carboxamide (2PY)$_m$



58%

Description

N1-methyl-2-pyridone-5-carboxamide (2PY) is a metabolite of NAD+ that can accumulate with increased NAD+ production. Elevated 2PY levels may inhibit enzymes like PARP, potentially impairing DNA repair and cellular energy metabolism, which could negatively affect longevity.

Nicotinamide riboside (NR, Precursor)$_m$

Nicotinamide riboside$_m$

54%

Description

Nicotinamide Riboside is a precursor to NAD+. Low levels can lead to reduced NAD+ production and decreased cellular energy, while high levels of NR indicate efficient NAD+ synthesis but could suggest over-reliance on supplementation.

1-MNA (NAD+ Metabolite)$_m$

1-Methylnicotinamide$_m$

21%

Description

1-MNA is produced by the enzyme NNMT. A byproduct of NAD+ metabolism. While it has anti-inflammatory and vasoprotective effects, elevated levels can signal increased NNMT activity, which diverts nicotinamide away from NAD+ recycling, potentially lowering NAD+ availability.

Nicotinamide (Precursor)$_m$

Nicotinamide$_m$

52%

Description

Nicotinamide is a form of vitamin B3, essential for NAD+ production and cellular energy. Low levels are associated with lower NAD+ production, and high levels are associated with inhibition of Sirtuins and NAD+ recycling pathways.

KETONES

Beta Hydroxybutyrate$_m$

3-hydroxybutyrate (BHBA)$_m$

43%

Description

3-Hydroxybutyrate (BHBA) is a ketone body produced during fat metabolism, primarily in the liver, and serves as an alternative energy source for the brain and muscles, especially during periods of low carbohydrate intake or fasting.

Acetoacetate$_m$

40%

Description

Acetoacetate is a ketone body produced in the liver during fat metabolism, serving as an alternative energy source for the brain and muscles, especially during periods of low carbohydrate availability or fasting.

SUPPLEMENTS

Alpha-ketoglutarate$_m$

11%

Description

Alpha-ketoglutarate is a key intermediate in the Krebs cycle, crucial for energy production, amino acid metabolism, and cellular function regulation.

Spermidine$_m$

30%

Description

Spermidine is a polyamine compound involved in cellular growth, proliferation, and apoptosis, known for its potential role in promoting autophagy and longevity, and is found in foods like aged cheese, soy products, and whole grains.