TruDiagnostic™
The Epigenetic Company

# Advanced TruAge Report

Patrick Ruff

Age: 41 | Sex: Male

Collected: 07/07/2026 | Reported: 08/09/2026

Reports corresponding to samples processed after November 10, 2025 have been generated using our updated analysis platform and newly trained algorithms. These improvements may result in minor differences compared to prior reports, reflecting advances in our technology rather than biological changes.

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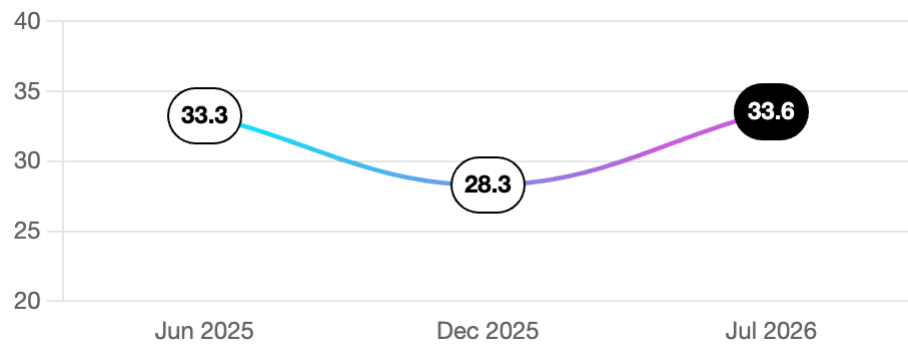
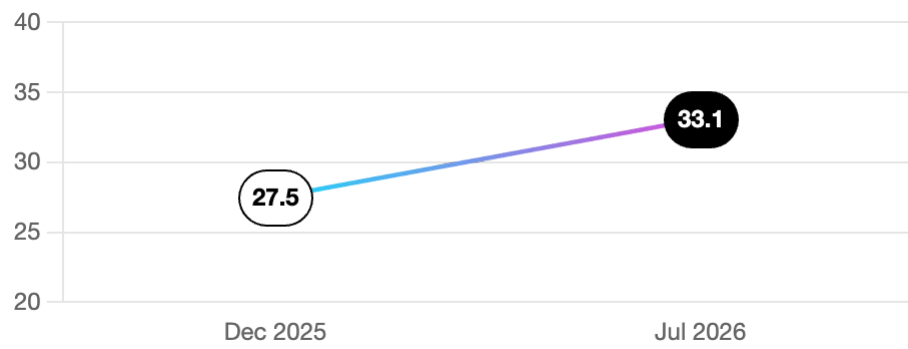
# Aging Summary

Chronological Age: 41.3

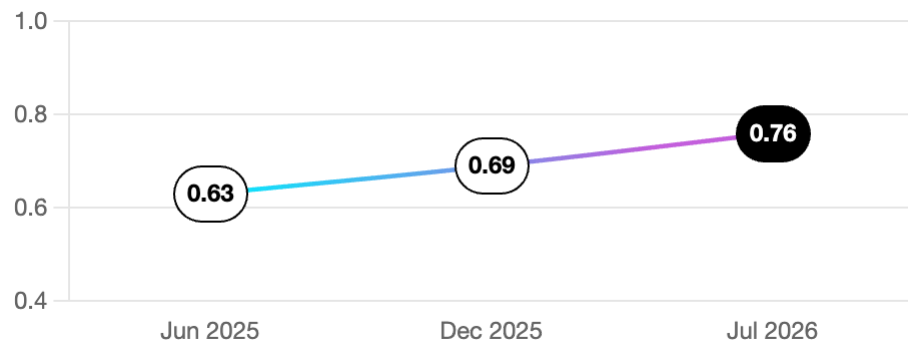
## OMICm Age




## Symphony Age




## Pace of Aging



DEVELOPED WITH HARVARD

# OMICm Age

Chronological Age: 41.3

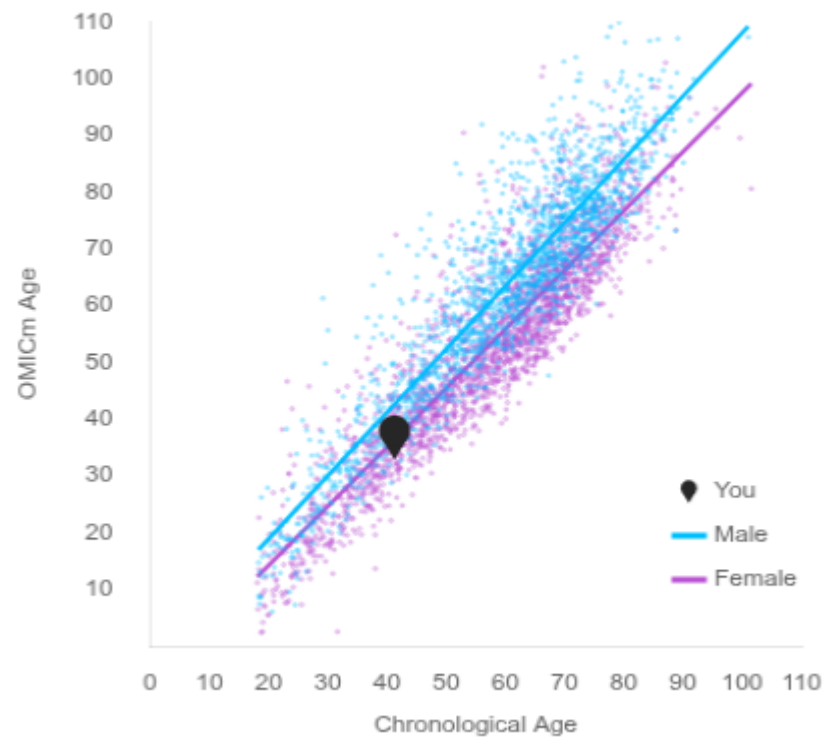
OMICm Age

33.6

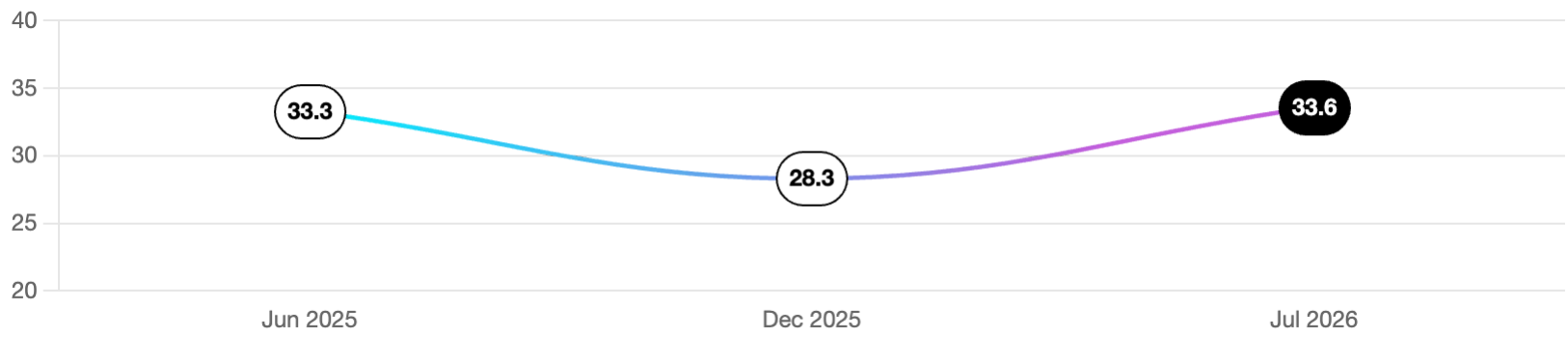
Younger

9.0%

Your OMICm Age is **lower** than 91.0% 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**

## Blood Urea Nitrogen

High

0 80 83.9%

**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

## Inter-alpha-trypsin Inhibitor Heavy Chain H3

High

0 80 90.1%

**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

## Uridine

Low

20 100 3.9%

**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

DEVELOPED WITH YALE

# SYMPHONY Age

Chronological Age: 41.3

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

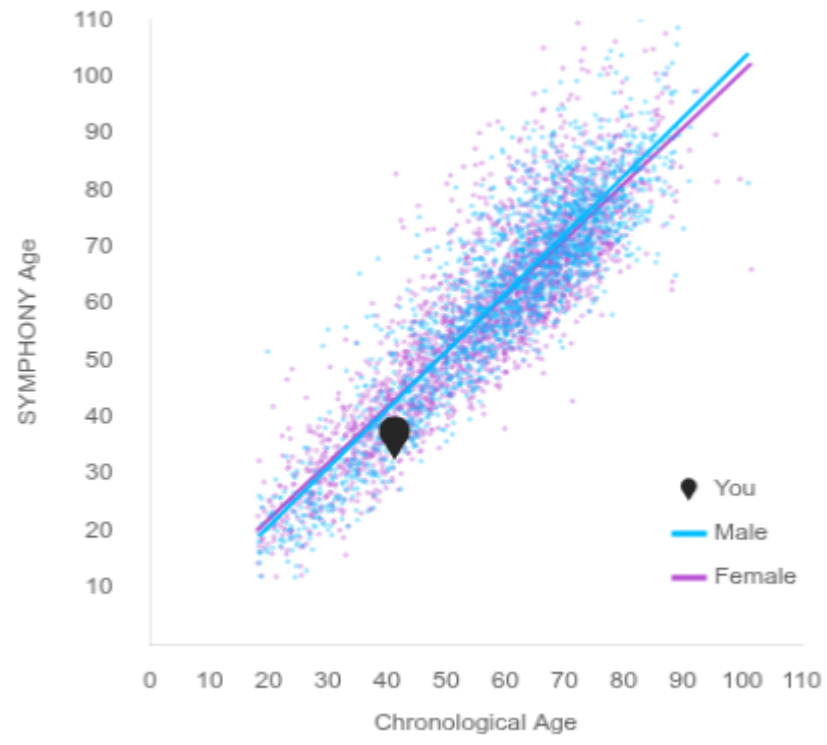
SYMPHONY Age

33.1

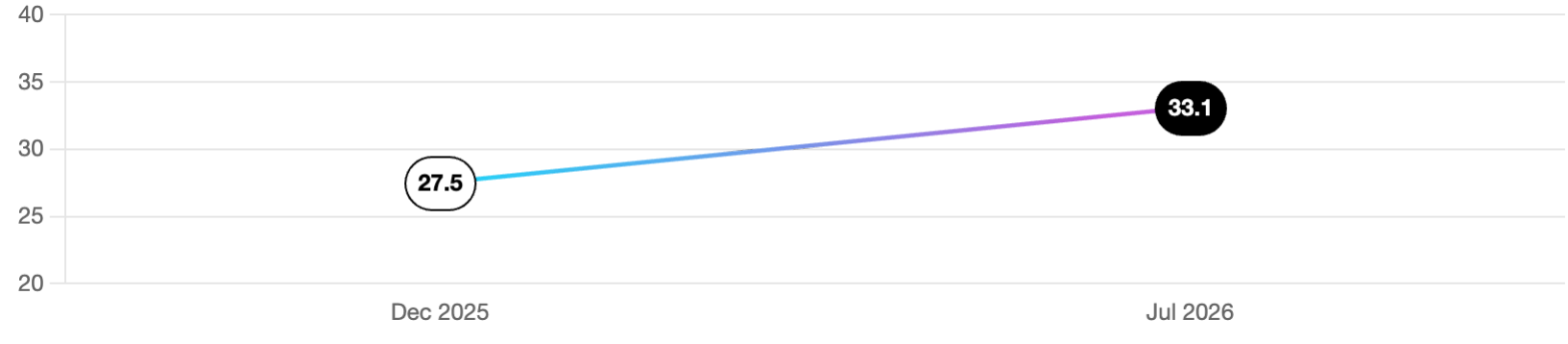
Younger

14.5%

Your SYMPHONY Age is **lower** than 85.5% of people of the same age and sex.




## Results Over Time




**NOTE:** The percentile for SYMPHONY Age 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. Our SYMPHONYAge algorithm was re-trained in November 2025 to enhance accuracy and performance. Samples processed before November 10, 2025, were reprocessed in December 2025, to reflect this updated model.

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

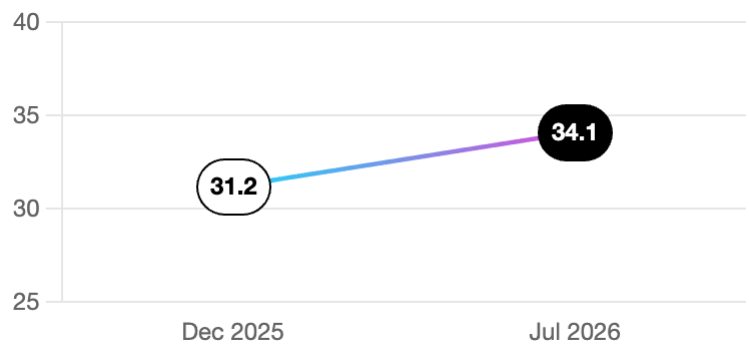
## How was this clock created and designed?

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

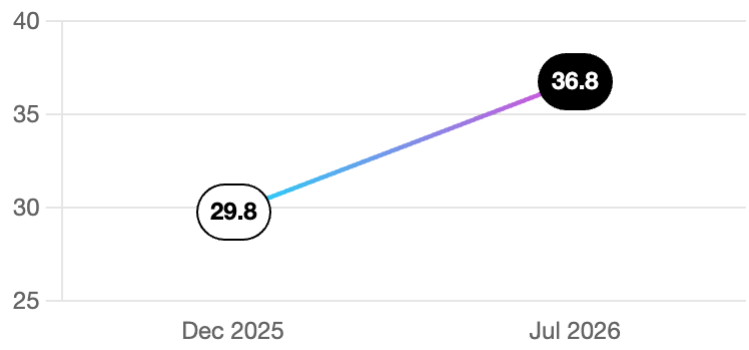
### Blood

**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



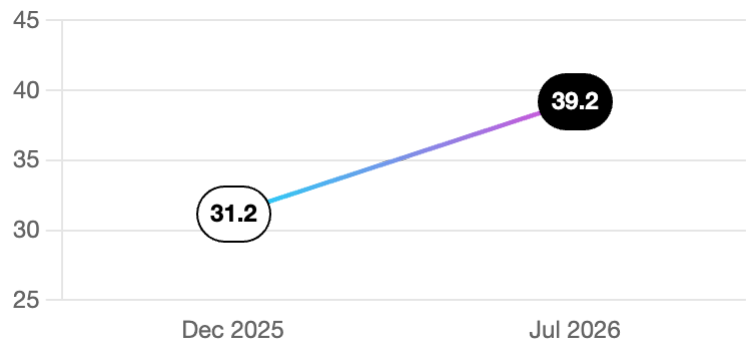

### Brain

**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



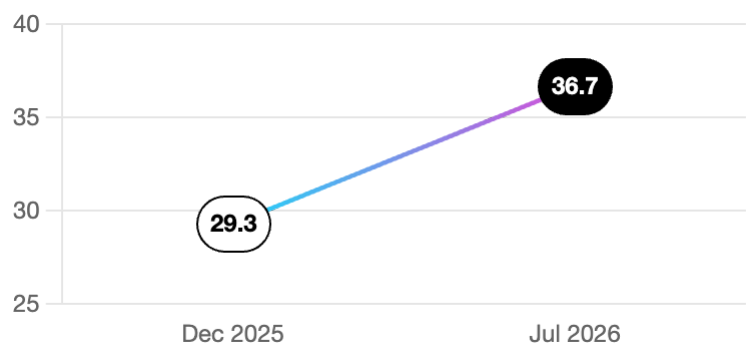

### Inflammation

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



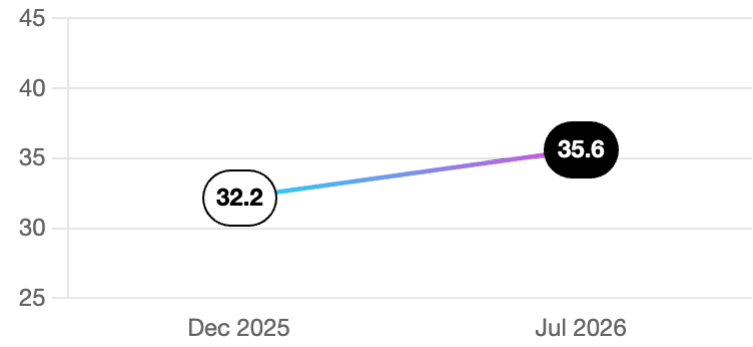

### Heart

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



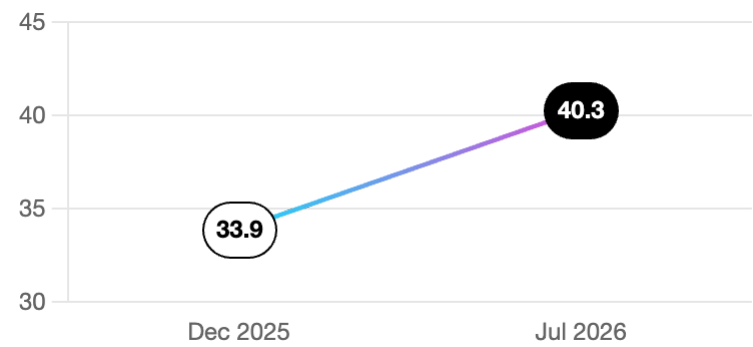
## Hormone

**Biomarkers:** IGF-1, DHEAS



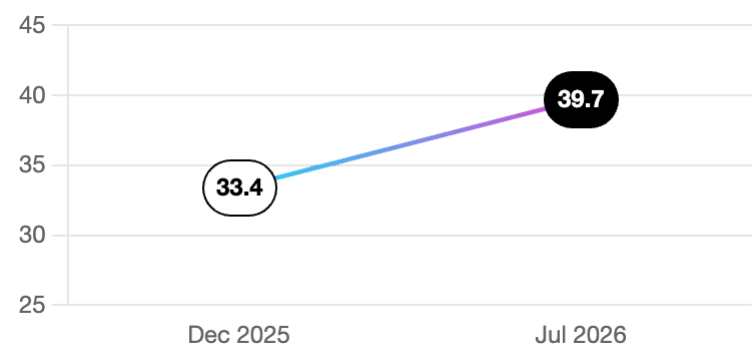

## Immune

**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



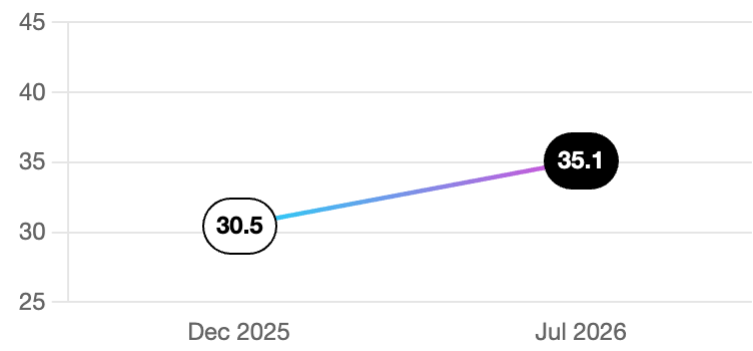

## Kidney

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



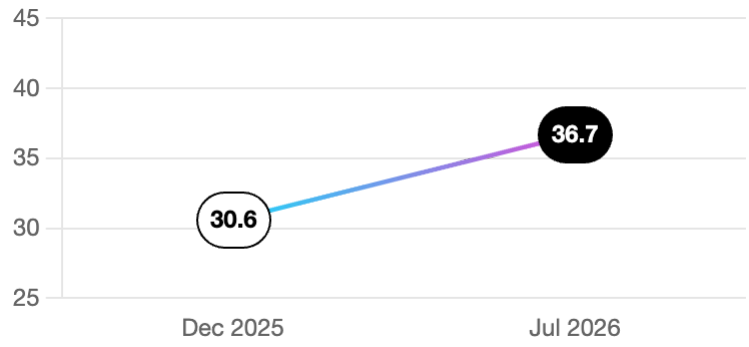

## Liver

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



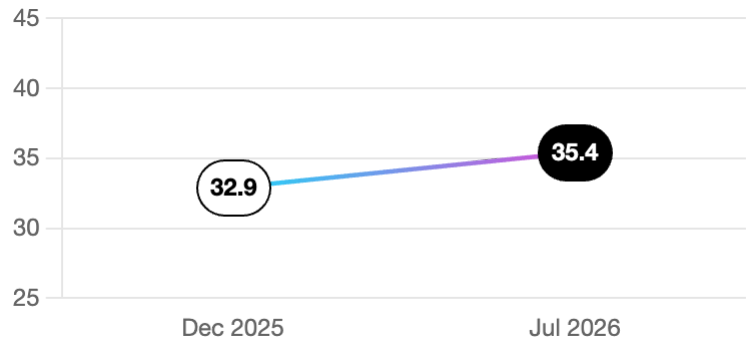
## Metabolic

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



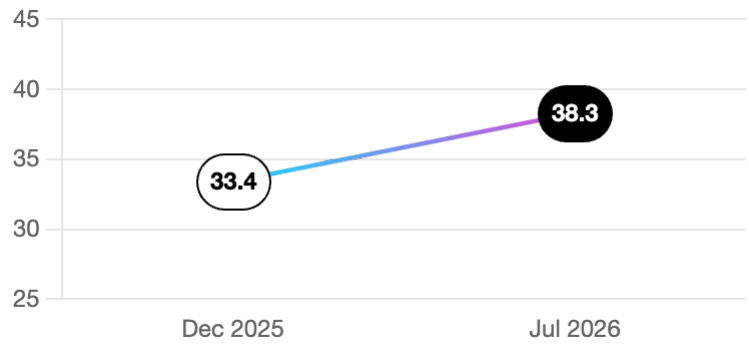

## Lung

**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



DEVELOPED WITH DUKE

# DunedinPACE of Aging

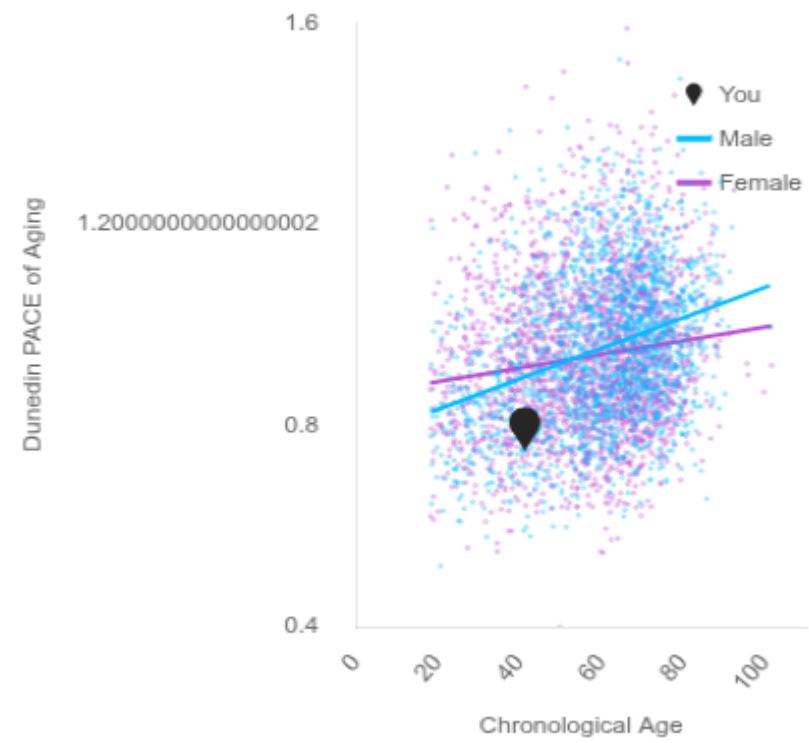
Chronological Age: 41.3

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

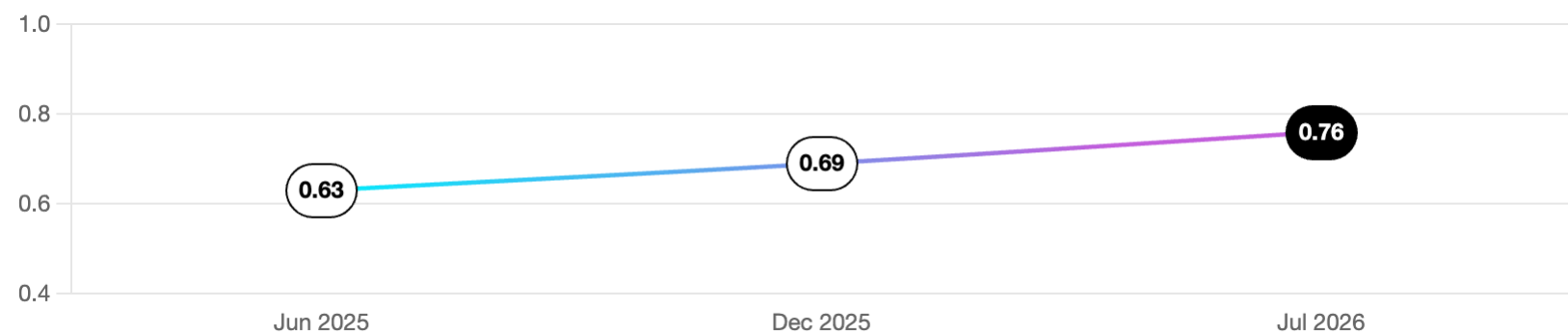
Your score < 1

Each year that passes, your body will biologically age **0.76 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 | 52.8% |
| Memory CD4T | Normal | 6.2% |
| Memory CD8T | Normal | 42.9% |
| Naïve CD8T | Normal | 69.7% |
| Basophils | Normal | 86.9% |
| B Memory | Normal | 47.5% |
| Naïve B | Normal | 17.3% |
| Regulatory T | Normal | 54.8% |
| Eosinophils | Normal | 32.9% |
| Natural Killer | Normal | 77.7% |
| Neutrophils | Normal | 76% |
| Monocyte | Normal | 17.9% |
| CD4T / CD8T Ratio | Low | 22.6% |

CD4/CD8T cell ratio is incredibly informative on disease. The normal range (ratio between 1.0 and 4.0, corresponding to the 30th–80th percentiles) helps to contextualize where your value falls. 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 | 53.4% |

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: 41.3

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

Telomere Biological Age

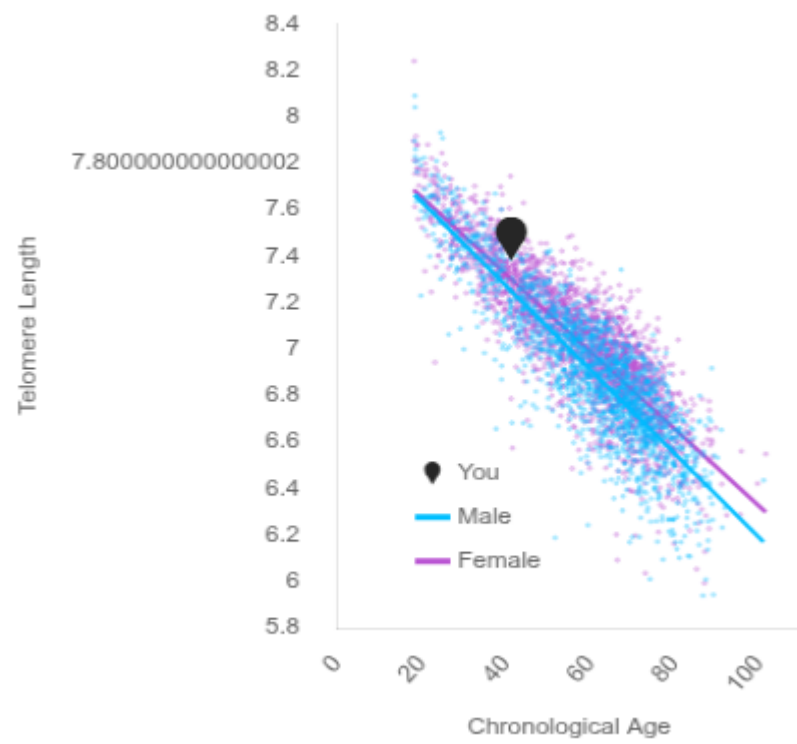
31.8

Younger

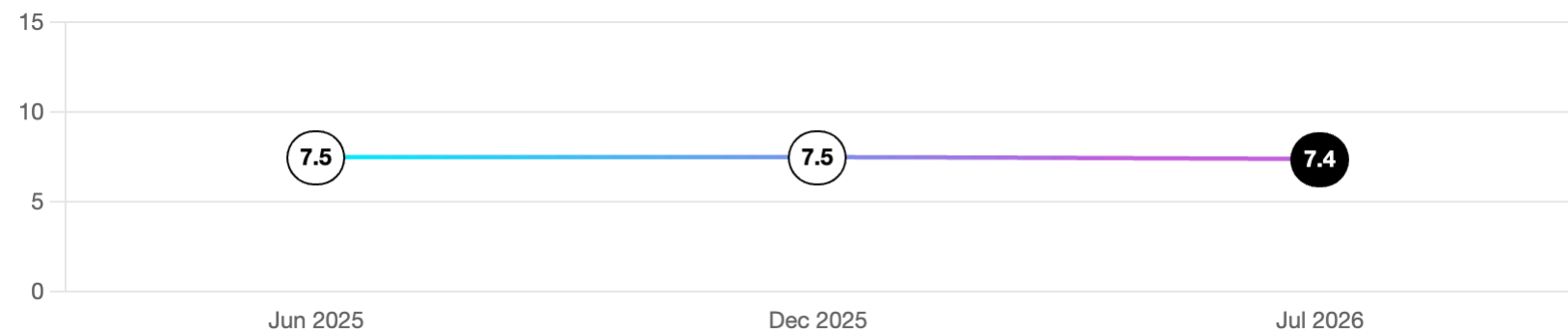
Telomere Length

7.4

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.

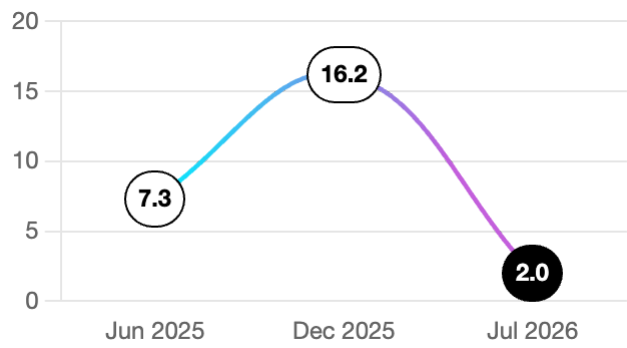
# Inflammation

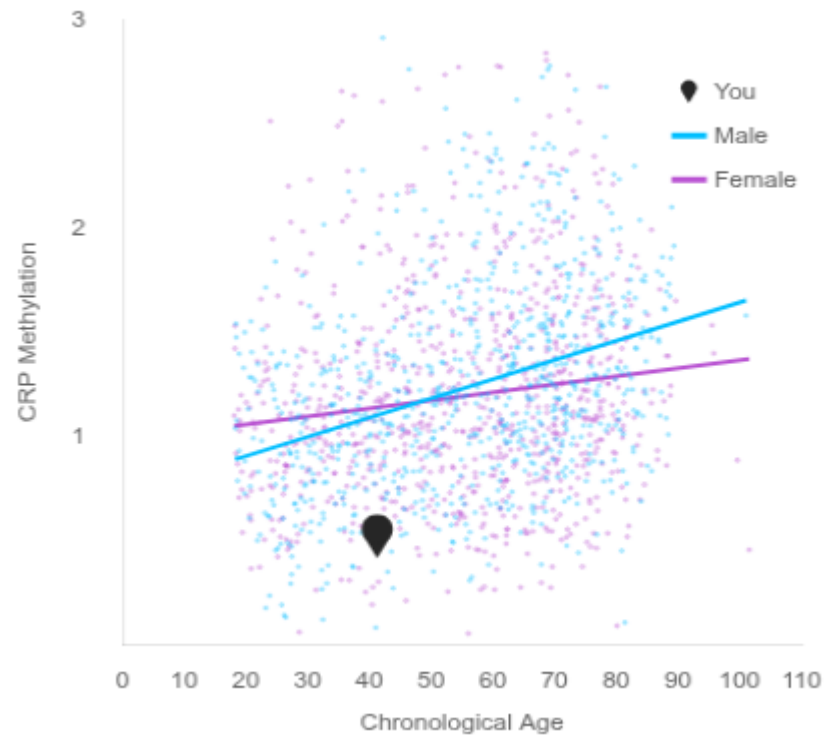
## CRP

2.0%

Your CRP methylation level is lower than 98.0% 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.



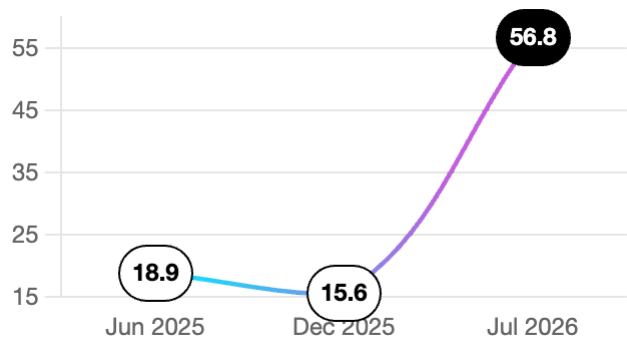



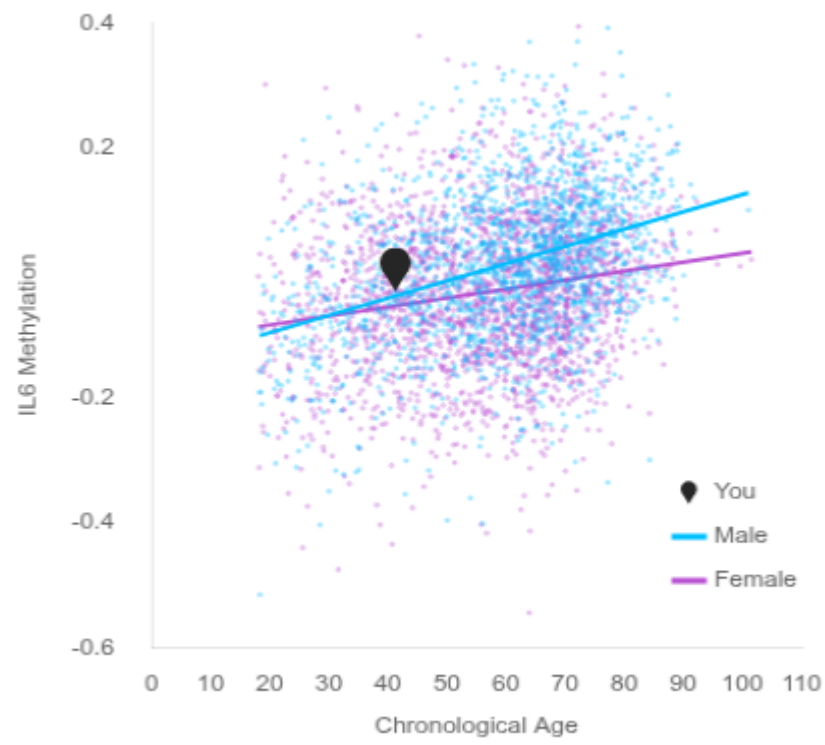

## IL-6

56.8%

Your IL-6 methylation level is lower than 43.2% 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.

# Relative **Smoking Risk**

Tobacco Smoking Epigenetic Predictor Low Risk 4.7%

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

# Relative **Alcohol Risk**

Alcohol Epigenetic Biomarker Low Risk 5.5%

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

# Additional Epigenetic Biomarkers

## Red Blood Cell Distribution Width

Normal

0 — 80 — 39.4%

**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 · Peppers · Leafy green vegetables · Citrus fruits · Tomatoes

## Albumin

Normal

20 — 100 — 63.3%

**Function**

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

**Recommendations**

- If applicable, consume high-protein 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 · Fish · Poultry · Eggs · Dairy · Legumes · Nuts

## Fasting Glucose

Normal

0 — 80 — 10%

**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

## Hemoglobin

Normal

20 — 100 — 72.9%

**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 · Eggs

Leafy green vegetables | Citrus fruits | Legumes

## Additional Epigenetic Biomarkers

### HbA1c — Normal

0 — 80 — 30.6%

**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 — 49.6%

**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 | Eggs | Leafy green vegetables | Citrus fruits | Legumes

### Alkaline Phosphatase — Normal

0 — 80 — 50.3%

**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

0 — 80 — 47.7%

**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

# Additional Epigenetic Biomarkers

## Carboxypeptidase B2 Normal

0 80 30.4%

**Function**

Carboxypeptidase B2: CPB2 helps balance blood clotting and inflammation. When it's in a healthy range, it supports good circulation and efficient recovery.

**Recommendations**

- Exercise regularly
- Manage stress
- Improve sleep
- Avoid smoking
- Eat more plan polyphenols, like berries, olive oil, green tea, and tumeric
- Limit refined carbs and sugar

Quercetin Magnesium

## Serum Paraoxonase/arylesterase 1 Normal

20 100 54.1%

**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

## Ribonuclease pancreatic Normal

0 80 49.1%

**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

## Ribitol Normal

0 80 17.9%

**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

## Vanillactic Acid

Normal

0 80

65.5%

**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

## Creatinine

Normal

0 80

65.3%

**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

11.3%

**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

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

Normal

0 80

9.1%

**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

38.9%

**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

73.9%

**Function**

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

**Recommendations**

- Consider NAC supplementation

NAC

## Gluconate

Normal

0 80

79.6%

**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

85.5%

**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 — 11.3%

**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 — 23.2%

**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 — 72.0%

**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 — 29.8%

**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

0 80

23.9%

**Function**

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

**Recommendations**

- Avoid being underweight
- Increase moderate-intensity exercise

## Histone H2B type 1-K

Normal

0 80

71.9%

**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

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

Normal

20 100

53.9%

**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