



Report generated for:
Boying Dun (250997237)

Sample collected:
4/18/2022

Introduction

Discover how you are aging

This report will contain your biological age and other health and longevity insights. Your sample has undergone epigenetic analysis, measuring thousands of sites across your DNA to determine whether they are turned "on" or "off" through a process known as DNA methylation.

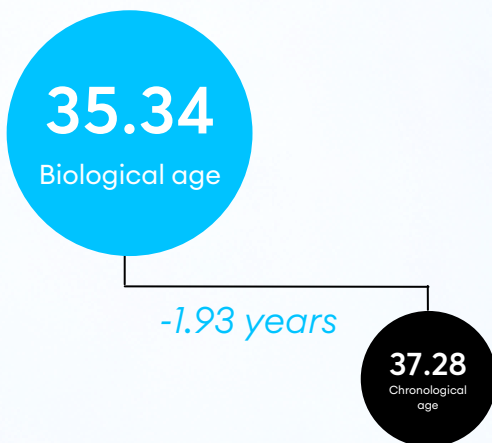
Built by world-leading researchers in the field, our comprehensive epigenetic test will provide you with new insights about how well you are aging.

No matter the results, take comfort in knowing that you can improve through healthy lifestyle habits.



See your results 

Your Results Summary



Your biological age is **1.93 years younger** than your chronological age.

You are aging at a slower rate. Your cumulative AgeRate is 0.95 meaning you have been aging 0.95 years for each year that has passed.

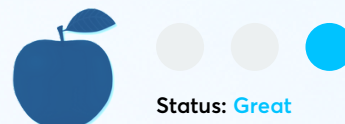
Chronic Inflammation

Your long-term exposure to low-grade inflammation.



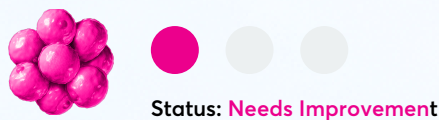
Diet Quality

The long-term impact diet has had on your health.



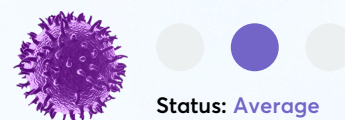
Metabolic Health

The long-term impact of body fat on your health.



Immune Health

How your immune system functions with age.

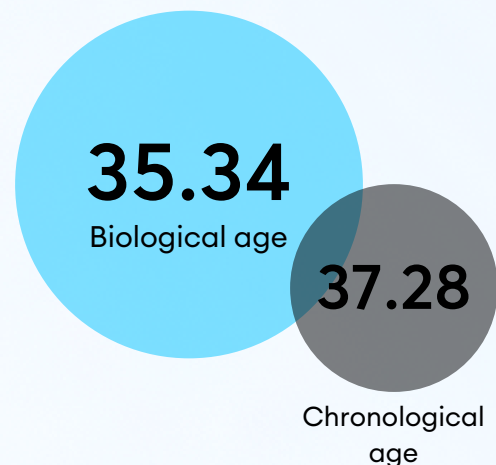


Your Biological Age

Before we ever experience the signs of aging, it's happening at the cellular level, as our fundamental biological processes change with time. These changes are recorded by your cells through DNA methylation. To get a more detailed picture of how you're aging, our scientists look at the methylation patterns across your genome and can reveal how old you appear to be on a biological level (your biological age).

Your biological age is lower than your chronological age

Your biological age is 35.34 years and 1.93 years younger than your chronological age. This means that your cells represent the age of someone who has a chronological age of 35. In an effort to improve, focus on a healthy diet, regular exercise, sleep, and lowering stress. Since your biological age is not fixed and can be changed based on your lifestyle, take the test again in one year to track your progress.



BIOLOGICAL AGE

How Do You Compare?



Your biological age is on average lower than people your chronological age

Compared to people of the same chronological age as you, your biological age ranks in the 63rd percentile. This means that in a group of 100 individuals of the same chronological age, your Biological Age would be younger than 63 of these people.

What the graph means

The graph shows the biological age and chronological age of 5,043 people. Each dot represents a person. Orange dots are people who have a higher biological age than chronological age. Blue dots represent people who have a lower biological age than chronological age. You are the black dot.

Your biological age is on average lower than others your chronological age + sex

Compared to people of the same sex and chronological age as you, your biological age is lower than most of these people.

What the graph means

The graph shows the biological age and chronological age of people of the same sex and chronological age group as you. Each dot represents a person. Orange dots are people who have a higher biological age than chronological age. Blue dots represent people who have a lower biological age than chronological age. You are the black dot.



BIOLOGICAL AGE

The Science

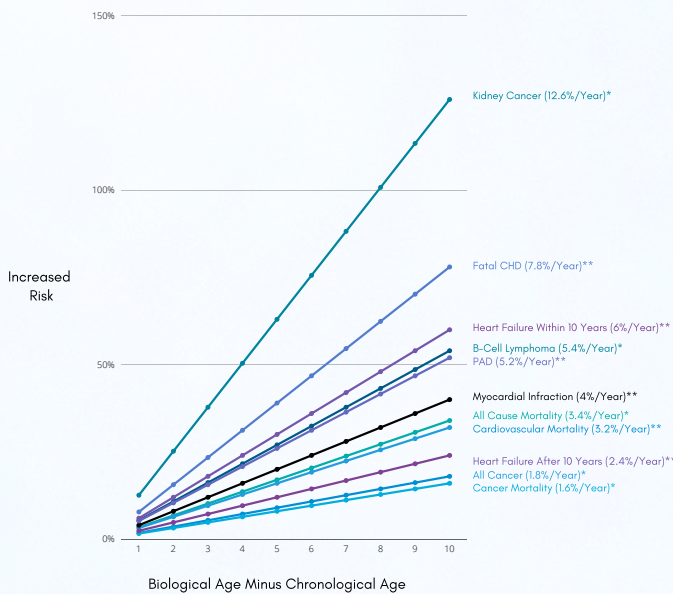
To identify DNA methylation markers associated with aging, the AgeRate team used a sophisticated machine-learning algorithm to analyze 14,000 men and women ranging from ages 18 to 100 from various ethnic backgrounds. To measure your DNA methylation levels in a fast, reliable, and comprehensive way, AgeRate uses a specially crafted “microarray”, a type of laboratory equipment that detects thousands of DNA methylation sites in a single experiment. By measuring your DNA methylation profile and comparing it to this large dataset, we can accurately reveal the age you most represent on a biological level (your biological age). This method of measuring biological age was pioneered by Steve Horvath from UCLA and has been used in dozens of peer-reviewed research studies showing associations between lifestyle, environment, disease, and mortality.

BIOLOGICAL AGE

What Does It Mean For You?

Know where you are in your aging journey

While you may think that chronological age is a good approximation for biological age, research has shown that people with the same chronological age can have large differences in biological age. Put another way, chronological age is like a compass that can point you in the right direction, but biological age is a modern GPS that tells you exactly where you are in your aging journey. Comparing your chronological age to your biological age tells you whether you have experienced accelerated, decelerated, or a similar rate of aging to what is expected.



*CANCER GENETICS AND EPIGENETICS, DIGUE (2018)
 ** CIRCULATION: GENOMIC AND PRECISION MEDICINE, ROETKER (2018)

Biological age is a better indicator of your future health than chronological age

Long before your hairs turn grey, your cells start to show signs of aging that are not visible to the naked eye. Accordingly, knowing your biological age today provides a glimpse of your future health and wellness that might otherwise be missed by your chronological age. Many research studies have shown that as compared to chronological age, younger biological age is a stronger predictor of avoiding future age-related diseases including dementia, cancer, and cardiovascular disease. Also, people with younger biological ages are less likely to develop classic signs of aging including increased weight, high blood pressure, poor sleep quality, and frailty.

BIOLOGICAL AGE

How to Improve

A variety of lifestyle and environmental factors have been shown to be associated with changes in biological age. Research has shown that biological age is 20% due to genetics, leaving the remaining 80% to be modifiable. We encourage you to adopt healthy lifestyle choices to see what changes work for you to improve biological aging. Abstain from smoking and heavy alcohol consumption. AgeRate research shows that people who do not smoke are, on average, 3-5 years younger biologically than people who smoke regularly. Also, people who do not drink alcoholic beverages tend to live 3-4 years longer than people who drink excessively (15+ drinks per week). Accordingly, an effective way to slow the effects of aging is to practice moderation with these vices. Maintain a healthy weight. AgeRate research finds that people who are leaner tend to have younger biological ages and live longer. A balance of dietary control and regular exercise can help you maintain a healthy weight.

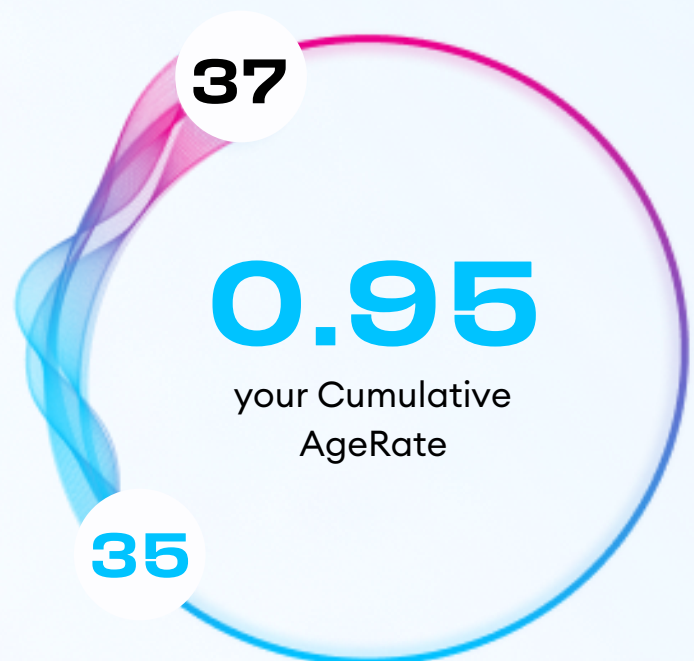
Your Cumulative AgeRate

Taking into account both your chronological and biological age, your cumulative AgeRate is a measure of the pace at which your body has aged for every year you've been alive.

In order to improve the difference between your chronological age and biological age, you want to continue to have a Cumulative AgeRate of less than or equal to 1.0. Like your biological age, your cumulative AgeRate is unique to you and is not fixed and can change based on your lifestyle.

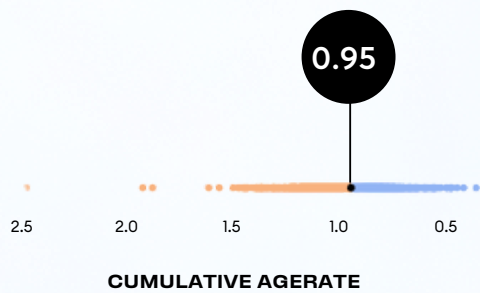
You are aging slower than time

Your Cumulative AgeRate is 0.95. This means that for each calendar year that has passed your body has aged by 0.95 years. An ideal cumulative AgeRate is less than 1.0, which would indicate you are aging less than one year each calendar year. Since your biological age is not fixed and can be changed based on your lifestyle, take the test again in one year to track your progress.



CUMULATIVE AGERATE

How Do You Compare?



Your Cumulative AgeRate is slower than the general population

Your Cumulative AgeRate is 0.95, which is slightly slower than average. Your Cumulative AgeRate is calculated by dividing your biological age by your chronological age.

What the graph means

The graph shows the Cumulative AgeRate for 5,043 people. Each dot represents a person. Orange dots are people who have a faster Cumulative AgeRate than you. Blue dots represent people who have a slower Cumulative AgeRate than you. You are the black dot.

CUMULATIVE AGERATE

The Science

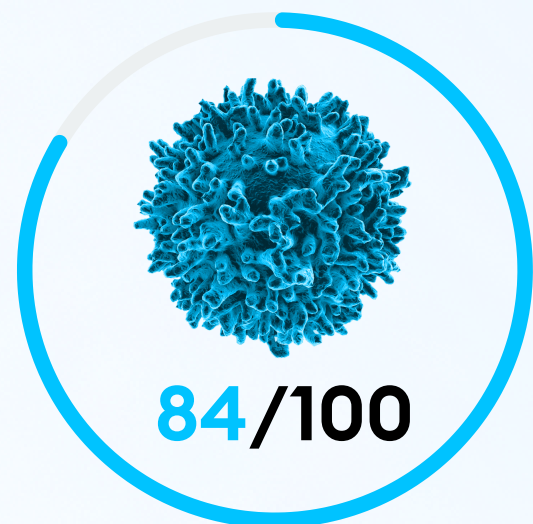
Your Cumulative AgeRate represents how well you have been aging across your lifetime and is calculated by dividing your biological age by your chronological age. This can be viewed as a metric for your long term health and longevity, capturing the long-term impact your lifestyle and environment has had on the rate at which your body is aging. The goal is to lower your Cumulative AgeRate over time through healthy lifestyle habits and track progress towards slowing down the aging process.

Your Chronic Inflammation

Inflammation is your body's essential response to injury and infection. But when inflammation becomes chronic, it can lead to tissue damage and accelerated aging. In fact, persistent low levels of inflammation are such a common feature of aging that it has been dubbed "inflammaging", and it can arise due to lifestyle and environmental factors, such as excess weight and unhealthy diet. Your Chronic Inflammation score reflects long-term exposure to low-grade inflammation, and by extension, the unseen detrimental effects it can have on your body over time, such as accelerated aging of arteries.

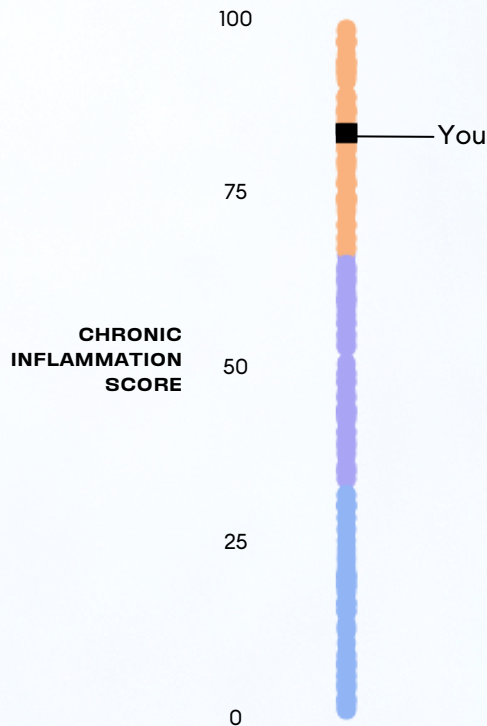
Your Chronic inflammation Score is above average

Your Chronic Inflammation Score is 84 and this means that your body has been affected by long-term low-grade chronic inflammation less than expected. There's always room for improvement, so consider some of the recommended actions in the following section, "How to improve?", to further improve your Chronic Inflammation Score.



CHRONIC INFLAMMATION

How Do You Compare?



Your Chronic Inflammation Score is above average compared to the general population.

Your Chronic Inflammation Score ranks in the 84th percentile. This means that in a group of 100 individuals, your Chronic Inflammation Score would be higher than 84 of these people.

What the graph means

The graph shows the Chronic Inflammation Score for people in our database. Each dot represents a person, you are the black square.

Blue dots are people who have a "poor" chronic inflammation score.

Purple dots are people who have an "average" chronic inflammation score.

Orange dots are people who have a "great" chronic inflammation score.

CHRONIC INFLAMMATION

The Science

Inflammation is a complex biological process with multiple cells, molecules, and markers involved. C-reactive protein (CRP) is one such marker that is released in response to inflammation. AgeRate calculates your Chronic Inflammation score by measuring 58 DNA methylation sites associated with CRP in an ethnically diverse sample of over 12,000 individuals. These results were replicated across individuals of European and African ancestry. Notably, since epigenetic markers act like a journal about our past and reflect long-term effects from our lifestyle and environment, your Chronic Inflammation score has a unique property in that it is capturing long-term effects of inflammation on your body rather than a one-time spot measurement of inflammation.

CHRONIC INFLAMMATION

What Does It Mean For You?

Epigenetics are designed to reflect long-term effects of inflammation.

The long duration of chronic inflammation is key to understanding its implications for health. Fortunately, epigenetic markers act like a journal recording long-term impacts of your lifestyle and environment. This means that, unlike a typical one-time spot measurement that can fluctuate over time, your Chronic Inflammation score provides a unique window into long-term effects of inflammation on your body.



Chronic inflammation has detrimental effects on our health.

Persistent low levels of inflammation tend to increase as you age and have negative consequences on your health. Therefore, reducing chronic inflammation can help protect against age-related diseases, such as obesity, diabetes, heart disease, and stroke.

CHRONIC INFLAMMATION

How to Improve

Chronic inflammation indicates exposure to genetic, lifestyle, or environmental factors that can adversely impact your health, but there are modifications that can improve your Chronic Inflammation score. Cutting back on smoking and managing your weight are two important lifestyle changes that will reduce inflammation. Also, there are anti-inflammatory diets that can help. These diets are rich in tomatoes, olive oil, green leafy vegetables, nuts, fatty fish, and berries or other antioxidant-rich fruits. You will want to limit refined or simple carbohydrates, fried foods, soda or sugar-sweetened beverages, red meat or processed meat, and margarine.

Your Metabolic Health

Weight is often seen as a general indicator of body fat, but it is no secret that the scale can be deceiving. Anyone who has measured their weight before and after a Thanksgiving dinner has probably seen their weight fluctuate dramatically even within a single day. Clearly, there is a need for a more stable and accurate measurement of body fat. This is where your Metabolic Health Score comes into play as it captures the long-term impact of fat on your body.

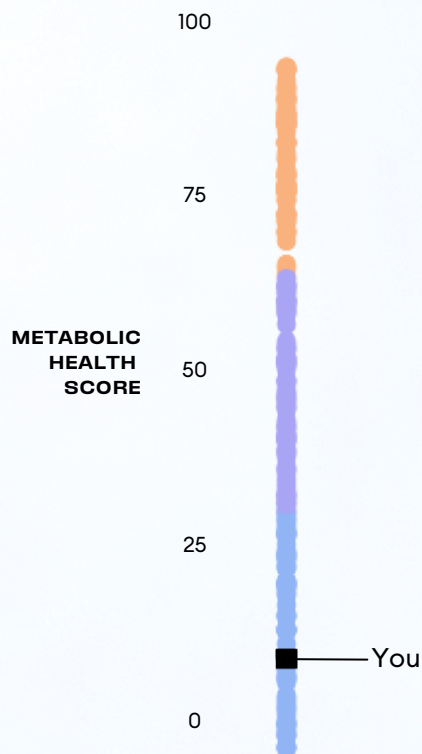
Your Metabolic Health Score is below average

Your Metabolic Health Score is 13, which is considered below average. This means that your body has been affected by adiposity more than expected. Consider some of the recommended actions in the following section, “How to improve?”, to improve your Metabolic Health Score.



METABOLIC HEALTH

How Do You Compare?



Your Metabolic Health Score is below average compared to the general population

Your Metabolic Health Score ranks in the 13th percentile. This means that in a group of 100 individuals, your Metabolic Health Score would be higher than 13 of these people.

What the graph means

The graph shows the Metabolic Health Score for people in our database. Each dot represents a person, you are the black square.

Blue dots are people who have a "poor" Metabolic Health Score.

Purple dots are people who have an "average" Metabolic Health Score.

Orange dots are people who have a "great" Metabolic Health Score.

METABOLIC HEALTH

The Science

The cells in your body that specialize in storing fat are called "adipocytes", and having excess fat is characterized by an increase in both the number and size of adipocytes. However, the overall impact of carrying excess fat on your body is more profound than just a specific effect on these so-called "fat cells". Studies show that many different cell types throughout your body are affected by adiposity including your liver cells and blood cells. The fact that the effects of adiposity resonate all the way to the cells that circulate in your blood is one of the reasons that AgeRate is able to accurately measure your exposure to body fat from your blood! Specifically, AgeRate calculates your Metabolic Health Score by measuring 187 DNA methylation sites that were identified to be markers of adiposity in a large, multiethnic study of more than 10,000 people. Interestingly, but perhaps not surprisingly, researchers have found that the overall pattern of DNA methylation changes caused by adiposity involves changes to important metabolic processes including insulin regulation and cholesterol transport.

METABOLIC HEALTH

What Does It Mean For You?

Your body has been less impacted by adiposity

Having some body fat is important to cushion our internal organs, keep us warm, and provide us with energy, but carrying too much can negatively affect our metabolic health, eventually leading to metabolic disturbances like high blood pressure and diabetes. Determining the extent to which excess fat affects our bodies is complicated - think about just a few of the factors involved: (1) the amount of excess fat you carry, (2) how long you have carried it, (3) where the fat is located, and (4) your individual metabolic response to fat. Your Metabolic Health Score captures all of these factors and more to tell you about how your body has been affected by adiposity.



The scale only tells part of the story

Underweight, normal weight, or overweight - your Metabolic Health Score is an important reflection of your metabolic health independent of your weight. This means that for two people who are similarly overweight, the person with the lower Metabolic Health Score will be more protected from metabolic disturbances despite both being overweight. On the other hand, a person who is underweight or normal weight who also has a high Metabolic Health Score has a higher chance of developing metabolic disturbances. Why is this the case? Well, research studies provide one potential explanation, showing that people with less fat located in the abdomen or lower torso region (“central adiposity”) are less likely to be at risk of obesity-related diseases. Accordingly, even if the scale may tell you that you are not in the overweight range, having that extra belly fat does really matter! There are many more subtleties that go into the inner workings of the Metabolic Health Score, but the point is that AgeRate goes beyond weight to determine how your body is being affected by adiposity, which is relevant to everyone.

METABOLIC HEALTH

How to Improve

Adiposity is influenced by many factors including diet, exercise, and genetics. Lifestyle interventions that result in sustainable weight loss will improve your Metabolic Health Score. Make incremental changes to your weekly physical activity routine and diet that can be sustained in the long term. Try to avoid high-calorie and nutrient-poor foods like sugary drinks. For more details regarding dietary considerations, please see your “Healthy Diet Score” report. When deciding to pursue weight loss strategies, please consult your physician before making substantial lifestyle amendments.

Your Diet Quality

Do you remember what you ate for lunch on Tuesday last week? If you can, kudos to you! On the other hand, if you fall into the majority of people who find it challenging to recall meals, then you understand how difficult it is to measure diet quality.

You might think that you are following a healthy diet but how do you know for sure? This is where your Diet Quality Score comes into play as an objective biological signature of exposure to a healthy diet.

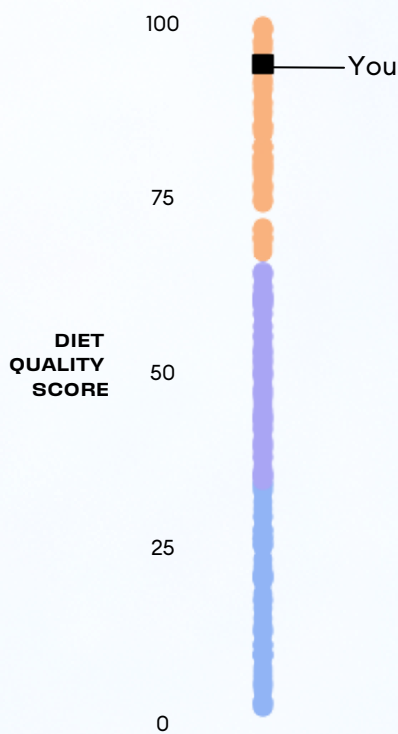
Your Diet Quality Score is above average

Your Diet Quality Score is 94, which is considered above average. This suggests that your diet resembles a healthy diet. Consider some of the recommended actions in the following section, “How to improve”, to improve your Diet Quality Score.



DIET QUALITY

How Do You Compare?



Your Diet Quality Score is above average compared to the general population

Your Diet Quality Score ranks in the 94th percentile. This means that in a group of 100 individuals, your Diet Quality Score would be higher than 94 of these people.

What the graph means

The graph shows the Diet Quality Score for people in our database. Each dot represents a person, you are the black square.

Blue dots are people who have a "poor" Diet Quality Score.

Purple dots are people who have an "average" Diet Quality Score.

Orange dots are people who have a "great" Diet Quality Score.

DIET QUALITY

The Science

Your Diet Quality Score is based on a study relating DNA methylation changes to diet quality in over 10,000 individuals. Specifically, this study found 26 DNA methylation sites related to diet quality. Notably, some of these diet-associated DNA methylation sites were found to impact genes that played specific roles in our digestive system. To gauge diet quality, this study used two indicators of healthy diet: The Mediterranean Diet Score, which is based on how close your diet resembles that of a traditional Mediterranean diet (emphasizing whole foods, fish intake over red meat, and healthy fats) and the Alternative Healthy Eating Index, which prioritizes healthy dietary habits that protect against age-associated diseases (for example: moderate salt intake). Together, the combination of these two complementary measures of healthy diet lead to a more holistic indicator of diet quality that is not necessarily specific to a single region.

DIET QUALITY

What Does It Mean For You?

Your Diet Quality Score is an objective measure of diet quality that directly relates to your health

What you eat actually influences your cells in a tangible way, which puts new and real meaning behind the saying, “you are what you eat”. A healthy diet leads to specific DNA methylation changes that help you avoid age-related diseases by protecting against chronic inflammation and metabolic disturbances. Accordingly, a higher Diet Quality Score verifies that you are on the right track, whereas a lower Diet Quality Score means that there may be some room for improvement!



Tracking your Diet Quality Score may help you find the right diet for you

The number of diets that are available to us can be overwhelming, and weight loss is only one indicator whether your diet is “working” or not. Your Diet Quality Score goes beyond weight loss and reflects the direct impact of diet on your health and wellness. Monitor your Diet Quality Score over time to find a sustainable and healthy diet that works for you!

DIET QUALITY

How to Improve

There is no single diet that works best for everyone because dietary preferences and how your body responds to certain foods vary from person to person. However, research studies have found some common elements of healthy diets associated with delayed aging. Generally, people with healthier diets will:

Eat more: Whole fruits and vegetables, whole grains (oatmeal, brown rice, quinoa), Fish and seafood, Foods rich in “healthy” fats (avocado, nuts, seeds, olive oil)

Consume less: Red or processed meat, Processed foods, White refined flour (pizza, white bread), Foods with added sugars (soda, candy, pastries), Salt, Alcohol

Your Immune Health

A healthy immune system is essential to your long-term health and wellness. Unsurprisingly, as we age, so do our immune systems in a process called “immunosenescence” that is associated with reduced immune health.

Besides simply fighting off infections, your immune system is important to a much broader set of age-related diseases. For this reason, although it is tempting to look at how often you catch a cold, you must consider a more holistic view of the body to get a true sense of your immune health.

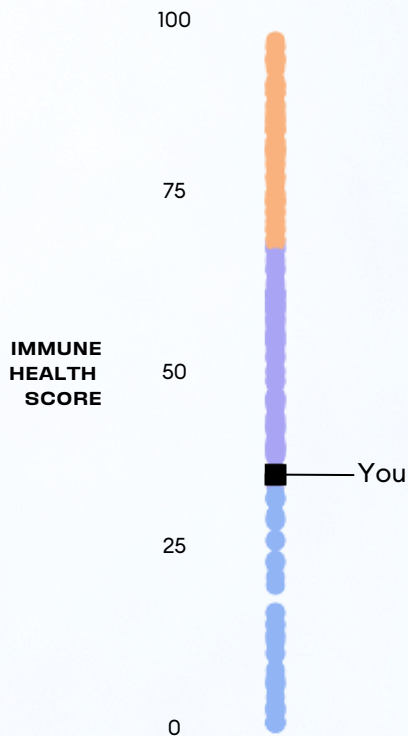
Your Immune Health Score is average

Your Immune Health Score is 34, which is considered average. This suggests that your immune system has been affected by aging as expected. Consider some of the recommended actions in the following section, “How to improve?”, to improve your Immune Health Score.



IMMUNE HEALTH

How Do You Compare?



Your Immune Health Score is average compared to the general population

Your Immune Health Score ranks in the 34th percentile. This means that in a group of 100 individuals, your Immune Health Score would be higher than 34 of these people.

What the graph means

The graph shows the Immune Health Score for people in our database. Each dot represents a person, you are the black square.

Blue dots are people who have a "poor" Immune Health Score.

Purple dots are people who have an "average" Immune Health Score.

Orange dots are people who have a "great" Immune Health Score.

IMMUNE HEALTH

The Science

The immune system is made up of many different types of blood cells with unique functions. The proportion of these blood cells can change with age, which reflects changes to the way your immune system is functioning. Since each type of cell has a unique DNA methylation signature, AgeRate is able to provide an indicator of your immune health by using epigenetics to estimate these cell proportions. Specifically, AgeRate research identified 350 DNA methylation sites that determine the proportion of neutrophils and lymphocytes - two major immune cells in your blood - from a study of over 5,000 individuals. A higher Immune Health score reflects a more optimal balance and regulation of your immune system. Note: This test is not clinically diagnostic or a medical indicator and it should not be interpreted as such. It is designed to be used as a tool to promote healthy lifestyle and wellness habits.

IMMUNE HEALTH

What Does It Mean For You?

A healthy immune system is more than the number of times you catch a cold.

The immune system is a complex collection of many types of cells in your blood that are responsible for repairing damage and defending you against foreign invaders - like viruses, bacteria, and parasites. But just because you get a runny nose or cold in the winter doesn't mean you have a weak immune system. In fact, these cold-like symptoms are signs of a healthy and functioning immune system, which is why we need a more holistic approach to measure immune health.



The immune system plays a multi-faceted role in health.

The immune system plays a role in other processes beyond protecting against infectious diseases, like recognizing cancer cells and clearing toxins from the body, which make it essential to health and wellness. Based on a large-scale analyses of 359,689 individuals conducted by AgeRate's Science team, and corroborated by independent studies, markers of immune health were implicated in a variety of age-related diseases including heart disease, diabetes, hypertension, arthritis, and cancer.

IMMUNE HEALTH

How to Improve

The immune system is made up of many different types of blood cells with unique functions. The proportion of these blood cells can change with age, which reflects changes to the way your immune system is functioning. Since each type of cell has a unique DNA methylation signature, AgeRate is able to provide an indicator of your immune health by using epigenetics to estimate these cell proportions. Specifically, AgeRate research identified 350 DNA methylation sites that determine the proportion of neutrophils and lymphocytes - two major immune cells in your blood - from a study of over 5,000 individuals. A higher Immune Health score reflects a more optimal balance and regulation of your immune system. Note: This test is not clinically diagnostic or a medical indicator and it should not be interpreted as such. It is designed to be used as a tool to promote healthy lifestyle and wellness habits.



What's Next?

Now that you have your baseline set, you can begin making healthy changes to your lifestyle to improve upon your results. Through repeat testing, you will be able to benchmark progress towards aging better.



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