



## Newsletter:

# How to Reverse the 12 Signs of Aging with Opt Health

Aging is inevitable, but it doesn't have to be a burden. In this newsletter, you will discover the 12 hallmarks of aging that affect your health and appearance. You will also learn how Opt Health can help you reverse them with cutting-edge epigenetic testing and personalized interventions. Whether you want to look younger, feel better, or live longer, Opt Health has the solution for you.

## The 12 hallmarks of aging

Longevity medicine has made remarkable progress in identifying specific aging markers. After finding the first nine, researchers added three more to the list of molecular, cellular, and systemic hallmarks of aging.<sup>1</sup>

These hallmarks form a complex, interdependent network. They all affect the natural aging process and can accelerate aging, but may also reverse it when targeted by therapeutic interventions.<sup>2</sup> This is the most interesting part: each hallmark can be a target for new anti-aging therapies and drugs.

Opt Health offers you cutting-edge, innovative epigenetic testing that shows you how you are aging. Epigenetic analysis tells you your real biological age and the exact steps to take to live longer and healthier. Our aging experts will use this information to create a personalized health plan for you to reduce your aging rate and increase your healthspan and lifespan. In simple words: epigenetic testing is a more targeted, effective way to reverse the hallmarks of aging.

Back to the hallmarks of aging:

1. *Genomic instability*

The genome is all the DNA in a cell. The DNA—wrapped around proteins called histones—forms chromosomes. Humans have 23 pairs of chromosomes in the cell nucleus, the cell's control center.

Many factors can damage the genome, causing errors in DNA copying, chromosome splitting, and chemical reactions. This can affect the DNA in the nucleus and the mitochondria, the cell's power source. If the cell can't fix the damage, it leads to normal or faster aging.<sup>1</sup>

## 2. *Telomere attrition*

Telomeres are sections of repetitive DNA located at the ends of chromosomes which, just like the plastic caps at the end of our shoelaces, protect the chromosome ends from getting tangled up or damaged.

When a cell divides, telomeres get shorter and shorter. When they are too short, the cell can't divide anymore. This means the cell is old and will undergo apoptosis—programmed cell death—soon. It can also indicate accelerated aging and serve as a marker of epigenetic age.<sup>1</sup>

## 3. *Epigenetic alterations*

Epigenetic alterations affect how our body interprets genetic information, without changing the DNA itself. They can be reversed and indicate how fast we age. Epigenetic testing can reveal our true biological age, internal and external age, and aging speed. Opt Health doctors use this data to design a personalized health plan for you.

Epigenetic alterations involve changes in DNA methylation, histone modification, chromatin remodeling, and non-coding RNA functional changes.<sup>1</sup> Methylation adds a methyl group to the DNA, which coils around proteins called histones to make chromosomes. RNA can be non-coding or coding, which provides information on how to make proteins. Chromosomes, proteins, and RNA make up chromatin.

## 4. *Loss of proteostasis*

Homeostasis is the ability of our body to maintain a balanced internal environment. Protein homeostasis, also known as proteostasis, is the balance of protein production and disposal in our cells. Poor proteostasis leads to many aging diseases, such as cataracts or Alzheimer's, in which misfolded or damaged proteins accumulate inside or outside our cells.<sup>1</sup>

## 5. *Disabled macroautophagy*

Macroautophagy (or simply, autophagy, “self-eating”) is the complex process of breaking down and removing proteins, large molecules, cell parts, or foreign invaders. A slower

rate of autophagy is associated with the natural process of aging. However, it can also cause faster, pathological aging.<sup>1</sup>

6. *Deregulated nutrient-sensing*

The nutrient-sensing network is a system of cell receptors and molecules that activate them, and the changes that follow inside the cell.<sup>1</sup> This network controls cell activity and metabolism according to the nutrients available.

In animals, genetic changes in the nutrient-sensing system can increase lifespan and healthspan. In humans, many treatments for cancer and metabolic disease affect this system.<sup>1</sup>

7. *Mitochondrial dysfunction*

Mitochondria make energy for the cell to work. Their activity is vital for the healthy functioning of the whole body. However, with age, these “powerhouses” start to malfunction and often trigger inflammation and cell death.<sup>1</sup> Mitochondrial deterioration contributes to the cellular changes associated with aging.

8. *Cellular senescence*

Senescence is the aging of cells and it can affect all cells in the body. Old cells build up in many tissues, especially in the connective tissue and the immune system.<sup>1</sup>

The presence of senescent cells is also linked to many health problems, such as kidney disease, fatty liver disease, diabetes, and Parkinson’s disease. However, research shows that removing old cells from aged mice can make them live longer and healthier.<sup>1</sup>

9. *Stem cell exhaustion*

Stem cells are extremely versatile cells that can transform into any cell type and repair damaged tissues. They are highly active during the early stages of development but their number and durability significantly decrease as we age. Regenerative medicine is seeking ways to use stem cell therapy to extend healthspan and lifespan.<sup>1</sup>

10. *Altered intercellular communication*

Aging affects how our cells communicate with each other. This disrupts the balance of our internal environment.<sup>1</sup> Poor cell communication can harm most of our bodily functions, causing problems in our hormones, nerves, or brain. Researchers have linked altered cell communication to normal and accelerated aging.<sup>1</sup>

### 11. *Chronic inflammation*

Inflammation increases as we age. This is why inflammatory conditions such as osteoarthritis or atherosclerosis are more prevalent in the elderly. Chronic inflammation goes along with immune system decline. That's why age-related inflammatory cytokines and other biomarkers in the blood can reveal how fast your cells are aging.<sup>1</sup>

### 12. *Dysbiosis*

Our health largely depends on our microbiome. The microbiome is all the microorganisms that live on and in our bodies—such as the skin and gut.

The microbiome is a hot topic in medical research. Scientists think our interaction with various bacteria, fungi, and viruses affects many diseases and conditions—and how fast we age.<sup>1</sup> The composition of the microbiome changes as we age, but rejuvenating and restoring its balance might increase our healthspan and lifespan.

## **What can you do to reverse the hallmarks of aging?**

There are different interventions that target aging. At the most basic level, Functional Medicine focuses on the fundamentals: leading a healthy life. Lifestyle modification—without any other interventions—may at least partially reverse the signs of aging. In addition to that, Opt Health physicians will recommend specific interventions such as , supplements to unlock your full potential for longevity.

### ***Nutritional interventions***

#### *Calorie restriction*

Calories measure the energy we get from food. The idea of calorie restriction is as simple as it sounds: eating fewer calories while still consuming all the essential nutrients. Researchers believe this may increase longevity and prevent age-related diseases.<sup>3</sup>

A study tested calorie restriction in non-obese, middle-aged people.<sup>3</sup> The researchers measured the effect this would have on longevity, disease, and quality of life. Over two years, participants were supposed to consume 25% fewer calories but only managed to reduce their calorie intake to 11%. Still, this restriction was safe and effective, reducing the speed of aging and positively affecting many of the hallmarks of aging.

Calorie restriction can be achieved by eating less calorie-dense, processed foods and more vegetables, fruits, and regenerative meats, eggs, and dairy.

## *Diet*

While specific diets have been studied for their potential benefits for longevity,<sup>4,5</sup> what's important is to consume a nutritious diet that contains a variety of natural or minimally processed foods. This means not only being intentional about choosing the right foods, but also avoiding wrong ones.

Some foods that support healthy aging include the following:

- Foods that provide high-quality protein, an essential nutrient for healthy aging, as it helps us preserve lean body mass. If possible, favor animal proteins that have been raised naturally.
- Foods that contain nutrients that support methylation, such as betaine, B vitamins (folate, vitamins B6, B12) and vitamin C.<sup>6,7</sup> You can find these nutrients in foods such as beets, eggs, leafy greens, beef, liver, and a variety of colorful fruits and vegetables.
- Foods that contain sulforaphane, a compound that has been shown to have anti-cancer and powerful antioxidant effects.<sup>8</sup> Sulforaphane is mainly found in cruciferous vegetables such as broccoli, cabbage, cauliflower, brussels sprouts, and kale. Broccoli sprouts contain a much higher amount of sulforaphane than mature broccoli.<sup>9</sup>
- Herbs and spices such as turmeric, rosemary, certain teas (matcha, green tea, yerba mate),<sup>10,11</sup> and garlic. These foods contain polyphenols which positively affect methylation and protect the cells from oxidative stress.<sup>12</sup>

On the other hand, certain foods can damage DNA and have a negative impact on healthspan and lifespan. These include:

- Sugar and refined carbohydrates, which trigger inflammation in the body, affect glucose metabolism, and disrupt the gut microbiome.<sup>13</sup>
- Other foods that may trigger inflammation for some people, for example grains and dairy. Remember, inflammation is always pro-aging.

## ***Supplementation***

### *B vitamins*

Vitamin B12, also known as cobalamin, is a water-soluble vitamin naturally present in animal foods. It plays many important roles in the human body: it helps make DNA, red blood cells, and even nerve cells.

Although the significance of vitamin B12 for the health and proper functioning of our blood and nervous system is well-known, researchers believe it can be combined with folates to reverse accelerated biological aging and decrease the overall DNA methylation levels.<sup>14</sup> Folate is the natural form of vitamin B9 and it is often combined with vitamin B12 so it's better absorbed in the gut. Pyridoxine (vitamin B6) also supports DNA methylation.<sup>15</sup>

### *Vitamin D*

Vitamin D is both a fat-soluble vitamin and a hormone that our bodies produce. Not many foods are rich in vitamin D, which is why taking a supplement is the best way to get enough of it. Our skin can also make vitamin D from sunlight. This highlights the need to supplement for those in extreme latitudes during the colder months.

Vitamin D helps our body use calcium and phosphorus for our bones, and lowers inflammation, fights infections, and even prevents cancer. Experts think vitamin D can also slow down aging.<sup>16</sup> The sunshine vitamin slows down epigenetic aging by changing DNA methylation and increasing telomerase activity.<sup>16</sup> Some experts recommend supplementation with at least 4,000 international units (IU) of vitamin D per day.

Taking a personalized dose of vitamin D, along with diet modifications, may reverse epigenetic aging by 1.3 years. Long-term supplementation may reduce epigenetic age by 0.25 years.<sup>16</sup>

### *Other supplements*

Other supplements for which some data exist on their positive effects on aging include resveratrol, epigallocatechin-gallate (EGCG), quercetin, and nicotinamide mononucleotide (NMN).

- *Resveratrol* is a naturally occurring antioxidant. It is a type of "polyphenol," a natural substance of plant origin. It is found in foods such as mulberries, peanuts, rhubarb, and grapes, which is also why it is present in red wine. There is evidence that suggests that resveratrol may prevent heart disease, improve cognitive function, and lead to a higher tolerance of stress.<sup>12</sup> This is the mechanism by which resveratrol may prevent cell damage and therefore have anti-aging properties.<sup>17</sup>
- *EGCG* is another polyphenol primarily found in green tea and other teas. It has antioxidant properties similar to resveratrol.<sup>18</sup>
- *Quercetin* is a flavonoid, a naturally occurring pigment found in red onion, dill, apples, and capers. Evidence suggests that quercetin may have antioxidant, anti-inflammatory, and immune support properties.<sup>19</sup> Quercetin belongs to a class of drugs called

“senolytics,” or molecules that kill dying (senescent) cells.<sup>20,21</sup> Quercetin has been shown to produce health benefits, improve exercise capacity and in animal models, it has also been shown to extend lifespan.<sup>22,23</sup>

- NMN is a safe and clinically proven way to boost NAD<sup>+</sup> (nicotinamide adenine dinucleotide) levels in the body.<sup>24</sup> NAD<sup>+</sup> is a molecule present in every living cell. It is involved in many processes in living organisms, including energy metabolism and cell survival. As we get older, NAD<sup>+</sup> levels decline steadily. This makes us more prone to disease and results in aging.<sup>25,26</sup>

## **Lifestyle Changes**

### *Physical activity*

Exercise is a key component of a healthy lifestyle. It lowers the risk of many diseases, such as heart disease and metabolic syndrome, and early death. There’s plenty of evidence to show that exercise also makes you stronger, happier, and sharper.<sup>27</sup>

Exercise can significantly slow down aging, especially when combined with nutritional interventions such as a low-calorie diet or calorie restriction.<sup>27</sup> Aerobic exercise—for example, running or biking—can change your DNA methylation, one of the hallmarks of aging. Research shows that increasing your activity levels may reduce your biological age by 0.30 years.<sup>27</sup>

At Opt Health, we suggest you do different kinds of exercise: aerobic, strength, and flexibility. For the best results, work out at least four times a week. Walking more or biking to work are efficient ways to integrate physical activity into your daily life.

### *Smoking cessation*

If you haven’t already, the new year is the best time to ditch bad habits. Cigarette smoke increases your overall risk of disease and shortens your life. There’s no other way to put it: smoking is probably the worst thing you can do for your health and longevity.

Smoking cigarettes has been linked to an increase in many hallmarks of aging, especially DNA methylation levels. Although ex-smokers may still have hypermethylated DNA, the methylation levels drop significantly as you quit smoking and becomes more like non-smokers over time.<sup>28</sup>

### *Stress reduction*

Stress is a useful response that helps us cope with challenges. In danger, stress makes hormones that help us “fight or flight.” Some stress can motivate us, improve performance, and spark creativity.

However, too much stress is harmful. Chronic stress in our lives—with the accompanying high cortisol and adrenaline—can hurt our physical and mental health. Too much stress hormones can increase the risk of high blood pressure, heart disease, diabetes, obesity, poor immunity, memory loss, and mental issues.

Stress may even make us age faster by changing our epigenetics and molecules related to aging.<sup>29</sup> Researchers found that poor emotional regulation can worsen the effects of stress on aging. On the other hand, good emotional control can reduce the impact.<sup>30</sup>

How can you feel young every day? Try these stress-relief methods:

- Practice mindfulness in your daily life.
- Learn deep breathing exercises.
- Try guided meditation.
- Take walks in nature.
- Try journaling.

#### *Alcohol avoidance*

There is conflicting evidence on the relationship between consuming moderate amounts of alcohol—for example, occasional beer or wine—and health benefits. However, researchers agree that too much alcohol can cause age-related diseases and early death.

Genome studies show the link between heavy alcohol and its effects on healthspan and lifespan.<sup>31</sup> Compared to non-drinkers, people with alcohol use disorder may age 2.22 years faster! Drinking promotes epigenetic alterations and genomic instability.<sup>31</sup>

#### *Sleep optimization*

Sleep is not a luxury, but a necessity—even in a world that values productivity over rest. Nighttime rest is the time to restore, regenerate, and ultimately, rejuvenate.

Plenty of studies have confirmed the importance of sleep for our physical and mental health. Conversely, insufficient sleep can increase the risk of many diseases, such as heart disease, stroke, dementia, and obesity.



Poor sleep is linked to a significant acceleration of epigenetic aging, even in younger people.<sup>32</sup> Aim to get at least eight hours of sleep every day and try to establish a consistent nighttime routine. Every cell in your body will thank you.

## The Bottom Line

Ready to reverse the signs of aging and unleash your inner youth? Contact us to get access to our team of experts who will guide you every step of the way. Join the Opt Health community and start taking charge of your health and life.

Thank you for reading and stay tuned for more tips and insights on healthy aging.

Until next time, be well and live long.

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