



## WHAT IS AGING?

Aging is a natural and inevitable journey, characterized by a gradual accumulation of changes in our body. When this process is unbalanced, it increases our susceptibility to illnesses. However, it invariably leads us to our ultimate destination—death.

Aging results from a combination of environmental, genetic, and epigenetic factors and is associated with diseases like cancer, cardiovascular disease, diabetes, and neurodegenerative disorders. Let's then explore to what extent molecular hydrogen can help balance this process to avoid these consequences.

## FACTORS CONTRIBUTING TO AGING PROCESS

### Oxidative Stress

The imbalance between the production of reactive oxygen species (ROS) and the body's antioxidant defenses contributes to aging.

[See Study 1](#)

[See Study 2](#)

### Senescent cells

Damage caused by ROS results in the generation of senescent cells: These are cells that lose their ability to self-replicate, contributing to aging and age-related diseases.

[See Study 1](#)

[See Study 2](#)

### Inflammation

Chronic inflammation is a feature of aging and contributes to age-related pathologies.

[See Study](#)

### NAD<sup>+</sup> Levels

NAD<sup>+</sup> is a co-enzyme involved in metabolic processes, and its decline is associated with aging and age-related diseases.

[See Study](#)

### Telomerase Activity

Telomeres protect DNA integrity, and their length decreases with age. The enzyme telomerase can reverse this shortening.

[See Study](#)

### Nrf2 Pathway

This pathway regulates genes combating oxidative stress, and its decline allows oxidative stress to drive aging. Nrf2 activation also declines with age.

[See Study 1](#)

[See Study 2](#)

These are just the main factors - there are still many other theories described about the impact on aging. However, it's important to note that these elements are tightly interconnected, or may even operate in conjunction.

# MOLECULAR HYDROGEN AND ANTI-AGING

Let's now delve into the science of aging and explore the potential role of molecular hydrogen in slowing down the aging process. Molecular hydrogen can play a very prominent role in aging process:

## Oxidative Stress Mitigation

Hydrogen water has been shown to mitigate oxidative stress, and may exhibit anti-inflammatory and anti-apoptotic effects.

[See Study 1](#) [See Study 2](#)

## DNA Damage Reduction

Another study indicated that molecular hydrogen is able to reduce DNA damage and prevent premature cellular senescence, making it a potential anti-aging agent.

[See Study](#)

## NAD<sup>+</sup> Level Maintenance

Hydrogen is proposed to be effective in protecting cells from damage that leads to a decrease in NAD<sup>+</sup> levels and maintains sirtuin activity.

[See Study](#)

## Telomerase Activity Increase

Hydrogen water may increase telomerase activity, protecting telomeres from degradation. A recent randomized controlled pilot trial has shown that the intake of hydrogen-rich water (HRW) favorably affected several aging-related features in healthy elderly individuals. The study concluded that hydrogen *"could be recognized as a possible anti-aging agent that tackles several hallmarks of aging, including loss of function and telomere length shortening."*

[See Study 1](#) [See Study 2](#)

## Nrf2 Pathway Activation

In a study, researchers concluded that "H<sub>2</sub> has long-lasting antioxidant and anti-aging effects on vascular endothelial cells through the Nrf2 pathway, even after transient exposure to H<sub>2</sub>", suggesting that *"Hydrogen-rich water may thus be a functional drink that increases longevity"*.

[See Study](#)

## FROM INNER VITALITY TO RADIANT SKIN: HYDROGEN'S DUAL ACT

Having delved into the rejuvenating wonders of molecular hydrogen within our bodies, let's now illuminate another facet of its charm – its ability to bestow a youthful glow and resilience to our skin, turning the mirror into a canvas of timeless beauty.



### Rapid absorption

By taking a HW bath, hydrogen nano-bubbles could **rapidly infiltrate into the dermis and be absorbed into the blood stream**. The data suggest that hydrogen molecules can rapidly pass through the skin and be absorbed into the blood stream.

[See Study](#)

## Enhanced skin appearance

This study revealed that the hydrogen-rich water bath improved the appearance of skin among persons with diverse ROS-related diseases. Thus, the HW bath with high-density nano-bubbles has beneficial effects on serum antioxidant capacity, inflammation, and the skin appearance.

[See Study](#)

Another study showed that hydrogen-rich water bath helps in the **lightening and size reduction of the dark dermal spots and stains**, improving skin quality and appearance: *"The wide-ranging, dense, and irregularly shaped skin blotches became markedly smaller and thinner, assumedly through reductive bleaching of melanin and lipofuscin and promotion of dermal cell renewal by the hydrogen-rich warm water."*

[See Study](#)

**Wrinkle repression** was clinically assessed using a HW-bathing. Thus, HW may serve as daily skin care to repress UVA-induced skin damages by ROS-scavenging and promotion of type-I collagen synthesis in dermis.

[See Study](#)

## CONCLUSION

While aging is inevitable, molecular hydrogen offers promising benefits in slowing down the aging process by targeting various factors contributing to aging. Given the knowledge of the benefits that hydrogen offers, the challenges of growing older could be mitigated.

[See Study](#)

