Healthspan vs. Lifespan

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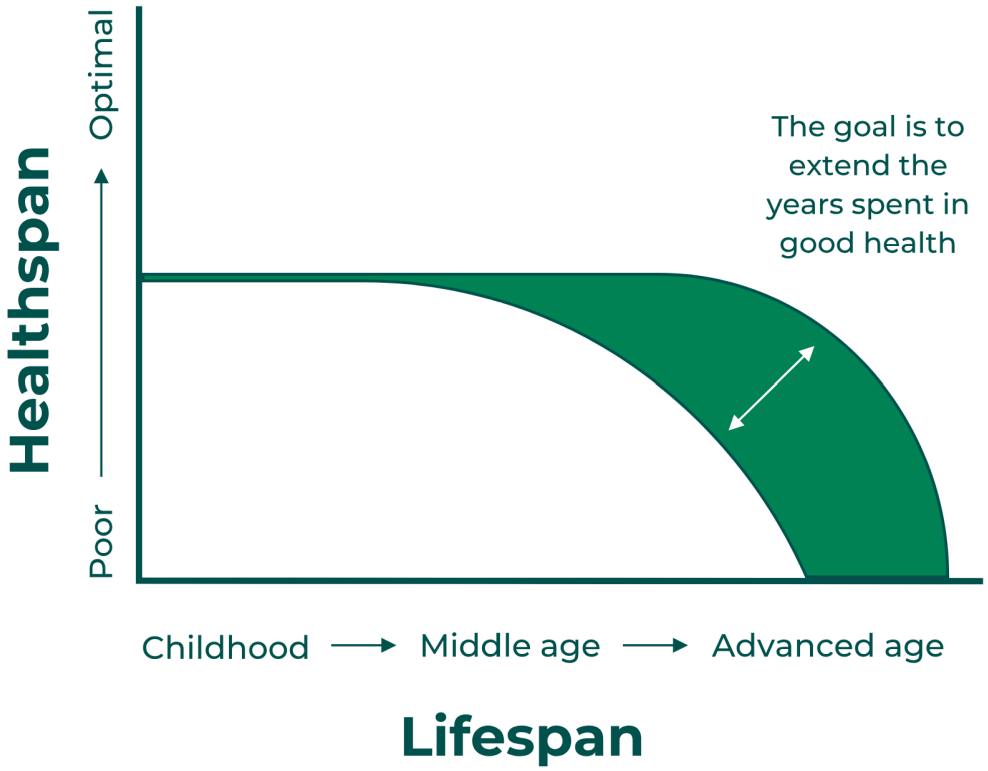
What is the definition of healthspan?

Healthspan is commonly defined as the period of life spent in good health, free from chronic diseases and aging-related disabilities.

The concept of healthspan is relatively new in aging research. Before 2000, only 14 papers on PubMed mentioned "healthspan," but by mid-2024, this number had risen to over 2,000.

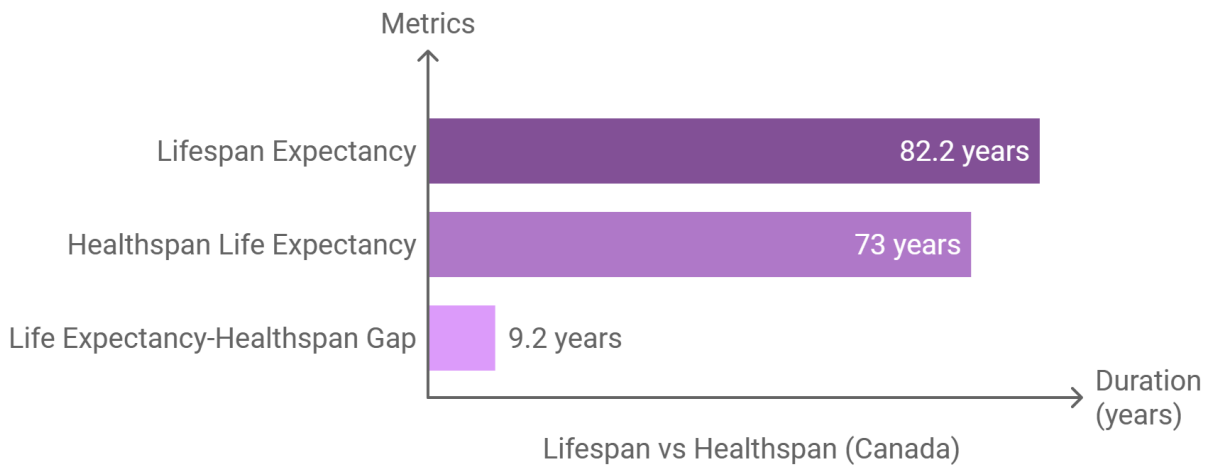


source: https://www.insidetracker.com/

Healthspan may be more integral to well-being than lifespan

It is essential to approach the subject of longevity with a critical mindset and recognize that the pursuit of longevity should not come at the cost of quality of life. Although a longer lifespan may imply healthier lives, this is not always the case. On average, there is a nine-year gap between healthspan (the period of life spent in good health) and lifespan.

While there is ongoing debate about the ethics of research focused on extending lifespan, most people agree that enhancing the duration of life spent in good health is a valuable objective. This focus has significant economic and social benefits.



Measuring healthspan

While we have reliable biomarkers for some diseases, like cholesterol for heart disease, many leading causes of death, such as cancers, lack good biomarkers. Given this challenge in predicting serious illnesses, how can we improve our understanding and measurement of healthspan?

Unlike Canada's average lifespan, which is just over 82 years, we don't have a statistic to mark the end of the average healthspan. The definition of healthspan has several issues. First, "good health" is subjective and can differ from person to person. Additionally, the health span concept oversimplifies health by viewing it as a strict good-or-bad binary. In reality, health fluctuates throughout life and typically declines with age, with variations among individuals.

The difference between chronological age and biological age

Chronological age refers to the total number of years a person has lived. Individuals born in the same year share the same chronological age, regardless of their appearance or how they feel.

Biological age, in contrast to chronological age, can vary significantly among individuals and may more accurately reflect the diversity of the aging process. It considers various factors and biomarkers—measurements that provide insight into the condition of cells and the body as a whole.

For example, a blood pressure measurement is a type of biomarker, as are assessments obtained through imaging technology and laboratory tests. Additionally, some biomarkers assess the body at the molecular and cellular levels by examining genes and proteins.

An example of a chronological and biological age difference occurs in older homeless adults. Because of prolonged exposure to stress, those living in poverty often experience premature aging, causing individuals to prematurely age by 10 to 20 years beyond their chronological age.

Chronic diseases

Chronic diseases are a significant cause for the gap between healthspan and lifespan.

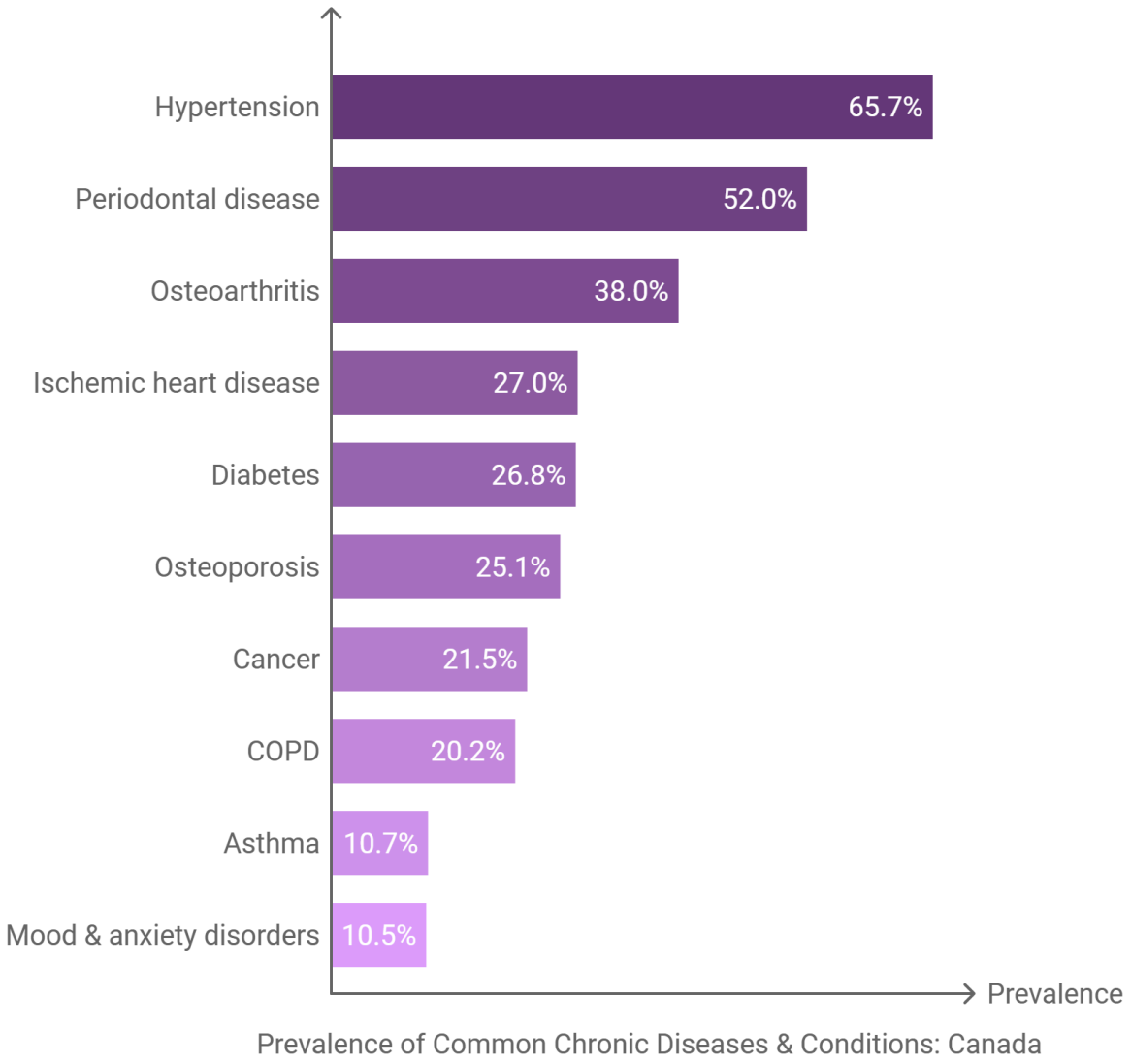
The incidence of chronic diseases and conditions tends to rise with age, making them the primary cause of mortality and disability globally.

73% of individuals aged 65+ years have at least **1 of 10** common chronic diseases.

Prevalence of the most common chronic diseases and conditions:

- Hypertension **65.7%**
- Periodontal disease **52.0%**
- Osteoarthritis **38.0%**
- Ischemic heart disease **27.0%**

- Diabetes **26.8%**
- Osteoporosis **25.1%**
- Cancer **21.5%**
- COPD **20.2%**
- Asthma **10.7%**
- Mood & anxiety disorders **10.5%**



Prevalence of Common Chronic Diseases & Conditions: Canada

source: https://www.canada.ca/en/services/health/publications/diseases-conditions/prevalence-chronic-disease-risk-factors-canadians-aged-65-years-older.html

Impactful lifestyle choices

Diet: A healthy diet is a key lifestyle choice - for example: a Mediterranean diet rich in fruits, vegetables, whole grains, and healthy fats is associated with longer telomeres and slower aging.

Exercise: Regular physical activity protects against chronic diseases, improves cardiovascular health, strengthens bones and muscles, and boosts brain function.

Sleep: Sufficient sleep (7-8 hours) is crucial for cell repair and rejuvenation. Sleep deprivation increases cortisol levels, contributing to inflammation and accelerated aging.

Social Connection: Strong social connections help reduce stress, improve mood, and boost immunity, contributing to longer, healthier lives. In contrast, loneliness and social isolation can increase the risk of chronic diseases.

Role of Genetics: While genes play a role in overall health, they are not the only determinants. Modifiable risk factors such as smoking, excess weight, insufficient physical activity, and chronic stress can be actively addressed to enhance healthspan.

Advancements in aging research

Personalized medicine: Tailoring treatments and interventions to individual genetic makeup and lifestyle. Startups are offering consumer solutions like DNA and blood tests that give personalized diet and exercise recommendations to enhance long-term health. Some companies are also developing therapies to combat aging and extend healthspan.

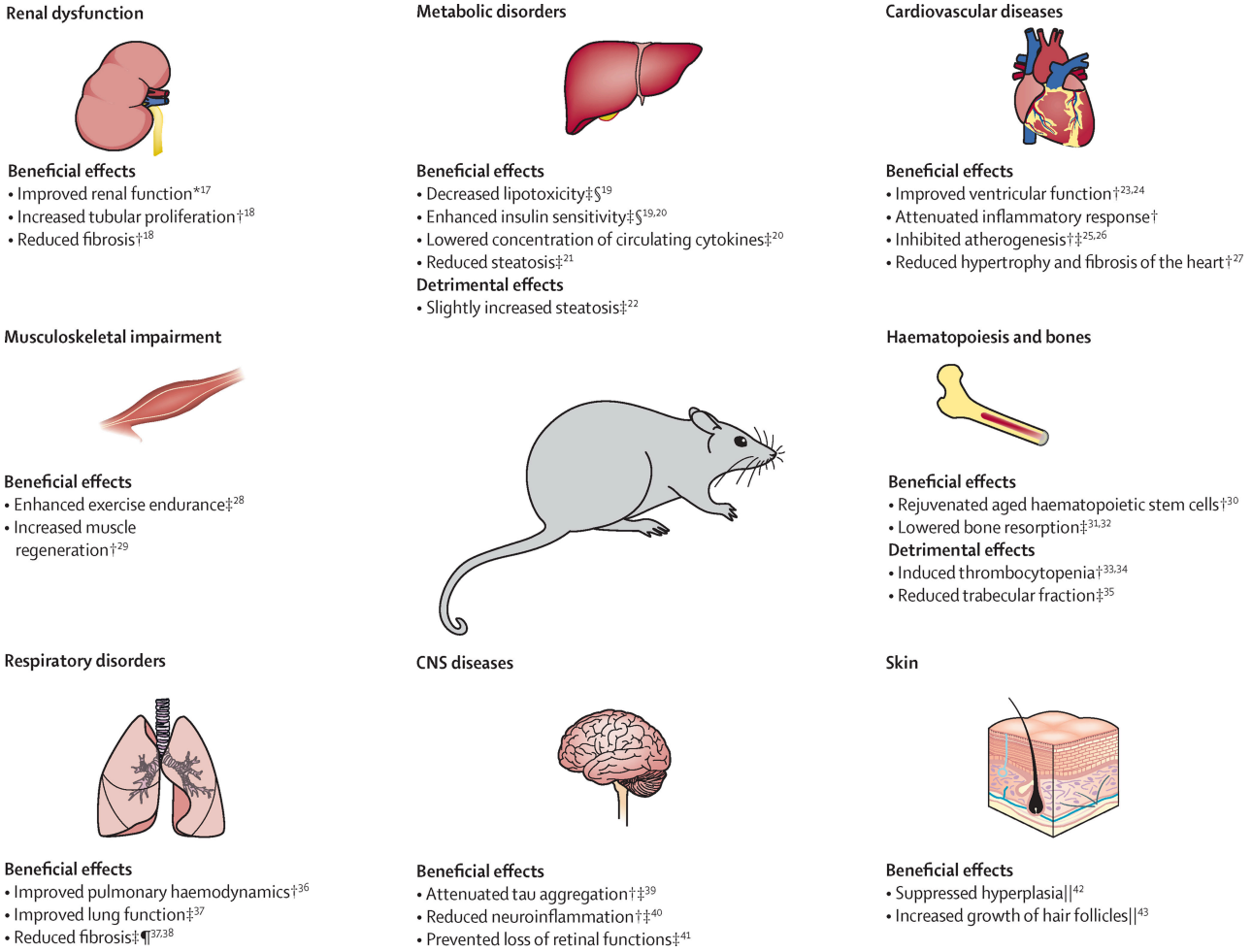
Regenerative medicine: Therapies focusing on repairing or replacing damaged tissues and organs. Addressing degenerative diseases in older adults is a

recognized priority of healthcare systems, as over half of individuals over the age of 70 present with chronic multimorbidity.

AI in healthcare: Enhancing early disease detection and personalizing treatment plans.

Senolytics: Drugs targeting and eliminating senescent cells (cells that contribute to inflammation and tissue damage as we age). In animal testing, these drugs extend lifespan, improve health span, and positively affect more than 20 pathologies with limited side effects.

IMAGE: The benefits and risks of senotherapeutics in tests on mice.



source: https://www.thelancet.com/journals/lanhl/article/PIIS2666-7568%2821%2900300-7/fulltext

We haven't been able to cure any of the diseases of aging. This might be because all of our organ systems are intricately connected, and as we age, all these

systems are breaking down little by little, at the same time.

Thanks to decades of research, scientists have arrived at a new unified theory of age-related diseases called the "hallmarks of aging." By repairing the hallmarks that are the source of the damage that leads to disease in the first place; scientists have demonstrated the ability to simultaneously slow, prevent, or even reverse many diseases of aging across multiple organs.

This theory has led to an explosion of new ideas, each with the potential to treat and prevent disease and keep us healthy. Scientists have shown this works in mice with over 75 interventions increasing mouse healthy lifespan.

The question is whether medicines that extend the longevity of mice will do the same for humans.

Summary

In summary, the steady rise in lifespan has been achieved but has yet to be matched with a proportionate increase in healthspan. The decline in quality of life among vulnerable older adults creates a substantial gap between healthspan and lifespan, presenting a significant challenge going forward.

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Last Updated: April 6, 2025