

R&D TRENDS: THE POTENTIAL OF ANTI-AGING RESEARCH

Overview

By gaining a deeper understanding of the factors contributing to the aging process, we can develop strategies to promote healthy aging and extend lifespan. Evolving trends highlight the importance of lifestyle interventions and pharmacological and genetic approaches.

Background: In an aging world population, research efforts are focused on developing effective interventions to promote healthy aging and extend lifespan.

Market potential: The global anti-aging market is expected to grow at a Compound annual growth rate (CAGR) of around 6.7% between 2022 and 2027. Venture capital investment has steadily risen within the industry, totaling over \$30.6B in 2022.

Key benefits: Anti-aging research is ripe for investment, with research efforts intensifying over the past decade. Research into the genetic, lifestyle, environmental, and social factors of aging could have important social and health-related implications.

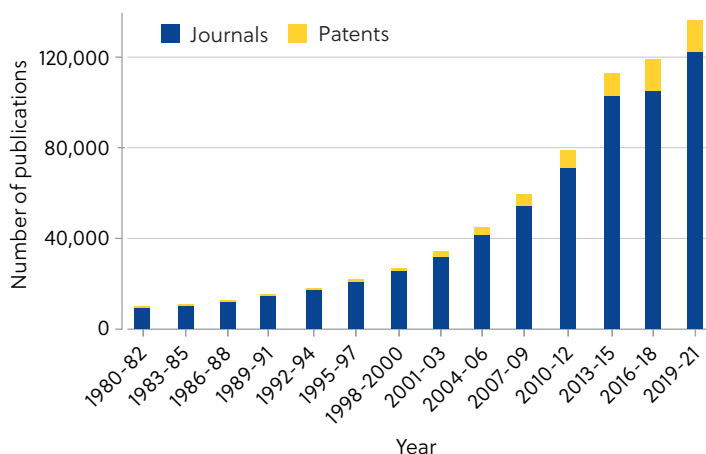
Key challenges: The complexity and heterogeneity of the aging process, combined with regulatory and ethical considerations, are significant barriers to the development of anti-aging interventions.

The rise in anti-aging research

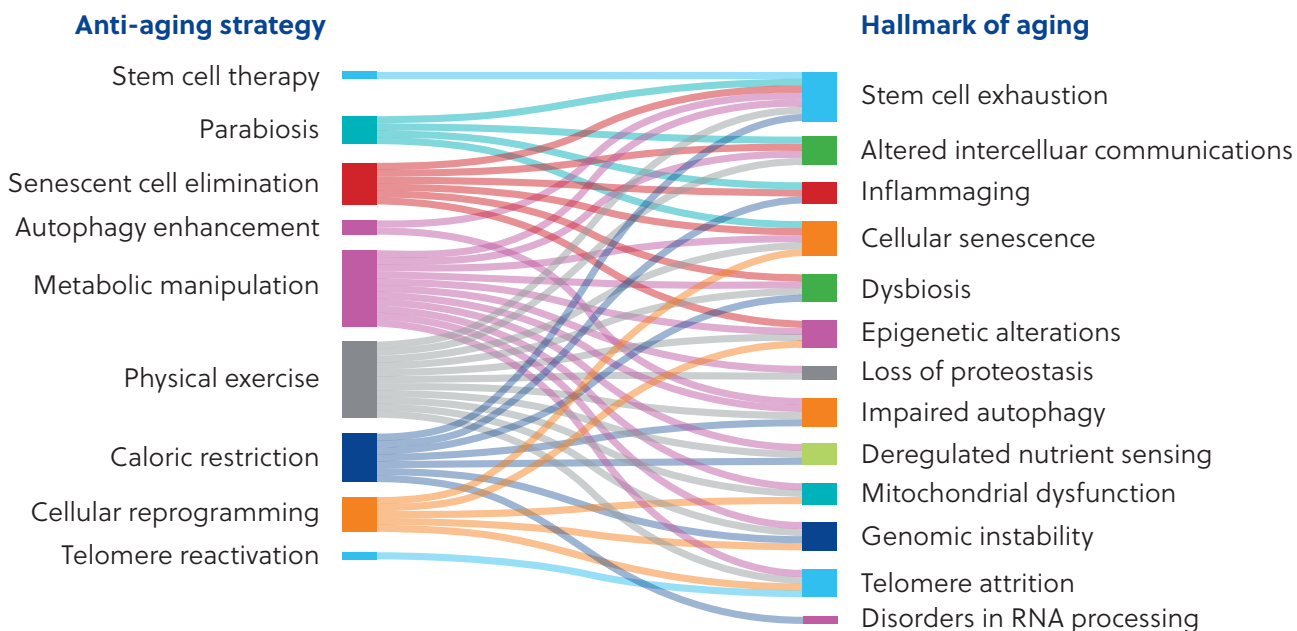
The understanding that advanced age is a major risk factor for disorders such as cancer and Alzheimer’s disease has brought anti-aging research to the forefront. Research into aging mechanisms and anti-aging strategies has grown immensely in recent years.

Anti-aging strategies

A variety of anti-aging strategies have been explored, from metabolic manipulations to senescent cell elimination and cellular reprogramming. Most strategies (e.g., physical exercise) may target multiple aging hallmarks.



Relationship between anti-aging strategies and the hallmarks of aging they counteract



Anti-aging drugs

Pharmacological anti-aging strategies have attracted much attention in recent years. Several promising classes of anti-aging drugs are being explored, targeting the global aging process rather than treating aging disorders once they occur.

- Caloric restriction mimetics — Modify age-associated pathways
- Senolytic drugs — Selectively eliminate senescent cells
- Telomerase activators — Abrogate age-related telomere shortening
- Epigenetic drugs — Counteract epigenetic dysregulation associated with aging
- Antioxidants — May curb oxidative damage contributing to cellular senescence and age-related telomere attrition and diseases
- Anti-aging peptides — Mainly used in anti-aging cosmetics and cosmeceuticals, but have promising applications in hair regrowth stimulation and weight loss

The field is dominated by natural compounds such as vitamins C and D, hyaluronic acid, and resveratrol, though synthetic agents (e.g., aspirin and metformin) are also being investigated.

Anti-aging clinical trials — Where are we now?

Clinical trials for bone, cardiovascular, and skin diseases, along with sleep disorders and obesity, are well established in the development pipeline with a large proportion of Phase III and IV trials. Other aspects of aging, such as balance disorders, cancer, and frailty, along with eye and neurological disease, are less established indications in the pipeline with the largest percentage of trials in earlier phases.

Percentage of therapeutic anti-aging clinical trials in various phases for the treatment of age-related disease indications

Indication	Early Phase I	Phase I	Phase I/II	Phase II	Phase II/III	Phase III	Phase IV
Bone disease	3%	8%	4%	14%	3%	25%	42%
Cardiovascular disease	3%	9%	6%	22%	3%	33%	23%
Skin disease	6%	14%	8%	15%	5%	22%	31%
Sleep disorders	4%	11%	4%	25%	7%	21%	29%
Obesity	6%	4%	10%	27%	4%	25%	24%
Musculoskeletal disease	1%	15%	6%	25%	4%	23%	26%
Eye disease	6%	22%	6%	28%	0%	17%	22%
Neurological disease	4%	11%	4%	36%	6%	19%	20%
Frailty	9%	9%	10%	38%	0%	16%	18%
Cancer	0%	8%	7%	57%	3%	20%	5%
Balance/Falls	14%	14%	10%	34%	0%	14%	14%

Looking ahead

Progress in anti-aging research has the potential to improve health and quality of life for older adults by promoting healthy aging and delaying the onset of age-related diseases. As such, we are seeing a shift from a disease-oriented research approach toward health-oriented prevention strategies such as physical exercise and caloric restriction.

Learn more at cas.org/insights

More comprehensive information and references can be found at cas.org/anti-aging-journal

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