



Conceptual image of telomeres (red), the protective ends of our chromosomes, which shrink as we age.

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TOWARD HEALTHY AGING

PUTTING OFF THE INEVITABLE

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The dream of cheating death has evolved into a scientific quest to extend healthy life span. Scientists and doctors are looking for ways to maximize the number of years that we live free of chronic diseases, cancer, and cognitive decline.

But before we can intervene, we have to understand the cellular and molecular mechanisms that drive aging and senescence. Some clues reside in our telomeres, the tips of our chromosomes that shrink with age. Others lie in our stem cells, which can only go on for so long repairing our tissues. Our mitochondria, too, the so-called powerhouses of the cell, may hold some answers to prolonging youthfulness. Other research points to changes in the gut microbiota associated with frailty in the aged. At a mechanistic level, the modulation of coenzyme NAD⁺ usage or production can prolong both health span and life span. Current geroscience initiatives aim to harness basic insights in aging research to promote general advances in healthy aging.

Questions remain throughout the aging field. By tweaking everything from genes to diets to environmental temperature and mating, scientists have created Methuselah flies and other remarkably long-lived animals while garnering fundamental insights into the biology of aging. Still, researchers puzzle over the most basic questions, such as what determines the life spans of animals. Meanwhile, a handful of molecular biologists are searching for ways to measure a person's biological, as opposed to chronological, age, but that quest, too, has proved elusive.

An ever-growing literature addresses both theoretical and pragmatic approaches to the challenge of aging. In this special issue, we have focused mainly on the cellular aspects of mammalian aging, with the goal of spurring future developments in promoting health span, if not life span.



INSIDE

NEWS

Why we outlive our pets *p. 1182*

Death-defying experiments *p. 1186*

The final countdown *p. 1188*

REVIEWS

Healthy aging: The ultimate preventative medicine *p. 1191*

Human telomere biology: A contributory and interactive factor in aging, disease risks, and protection *p. 1193*

Stem cells and healthy aging *p. 1199*

Mitochondrial dysfunction and longevity in animals: Untangling the knot *p. 1204*

NAD⁺ in aging, metabolism, and neurodegeneration *p. 1208*

PERSPECTIVE

Gut microbiota and aging *p. 1214*

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