

Senescent Cells Mapped in Human Body Over the Lifespan

The atlas could help track how senescent cells drive age-related conditions and may inform treatment strategies for age-related diseases.

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At a Glance

- Scientists located and classified senescent cells, a hallmark of aging, to begin building an atlas of these non-dividing cells in the human body.
- The atlas could help track how senescent cells drive age-related conditions and may inform treatment strategies for age-related diseases.

Senescent cells arise in almost every tissue in the body when cells experience damage that is severe enough to halt cell division. Although senescent cells remain active and contribute to normal processes such as tissue regeneration and wound healing, they can build up and linger in our tissues as we age. This buildup over time can lead to scarring, chronic inflammation, and age-related illnesses. A better understanding of senescent cells is needed to develop strategies to remove them and treat a variety of age-related conditions.

Researchers in the Cellular Senescence Network (SenNet) consortium, funded by the NIH Common Fund, aim to identify and classify senescent cells in the human body. The group recently published three studies that shed new light on different types of senescent cells, where they're located in the body, and their links to health and disease.

A team led by Dr. Carlos Anerillas at NIH's National Institute on Aging (NIA) constructed a new tool called the Senescence Catalog (SenCat). The database includes changes in gene activity and proteins in various senescent cells. The results were published in [Molecular Cell](#) on June 11, 2026.

The team analyzed gene activity and protein levels in 14 types of human senescent cells. They found that different senescent cells had different patterns of change, called "senotypes." But certain biochemical pathways were enhanced in almost all cell types. These included pathways involved in altering metabolism, repairing tissue, and responding to damage.

Using machine learning, the researchers developed senescence scores based on the data in SenCat. These scores could distinguish senescent from non-senescent cells more accurately than traditional markers. The senescence scores were used to track the buildup of senescent cells over time in various organs in live mice.

In a companion study, Drs. Nathan Basisty and Bradley Olinger at NIA assessed the clinical relevance of proteins identified from SenCat data. To do so, they measured senescence-associated protein levels in the blood of more than 2,000 participants from two long-term aging studies. The results were published in [Cell Reports](#) on June 11, 2026.

The team found that senescence-associated proteins were better at predicting a person's age than non-senescence-associated proteins. They were also better at predicting age-related measures like walking pace, diabetes status, high blood pressure, and kidney disease.

Senescence in specific cell types tended to be associated with health traits related to those cells. For instance, senescence in kidney cells was strongly associated with kidney disease.

Senescence in fat cells was strongly associated with body mass index. Senescence in immune cells was linked with future mortality and diabetes onset. These findings suggest that senescence markers could provide detailed information about a person's health and inform who will benefit most from therapies that target or remove senescent cells.

Another NIH-funded team led by Dr. Rong Fan at Yale University mapped various senescence markers in human lymph nodes. Their findings appeared in [Cell Press Blue](#) on June 8, 2026.

In samples from 51 donors, ages 18 to 86 years, the researchers saw changes in senescent cell locations with age. The oldest lymph nodes featured clusters of senescent B cells. These showed signs of impaired antibody production and metabolic alterations. The results suggest how the immune system becomes less effective with age.

“By mapping where different senotypes are found and what makes them unique, we aim to build a more complete picture of senescent cells across the body,” says Dr. Nicole Kleinstreuer, who leads the NIH Common Fund. “This knowledge could help researchers move toward more targeted therapies that focus on harmful cells while preserving beneficial ones.”

This [research summary](#) was published by the National Institutes of Health on July 1, 2026.