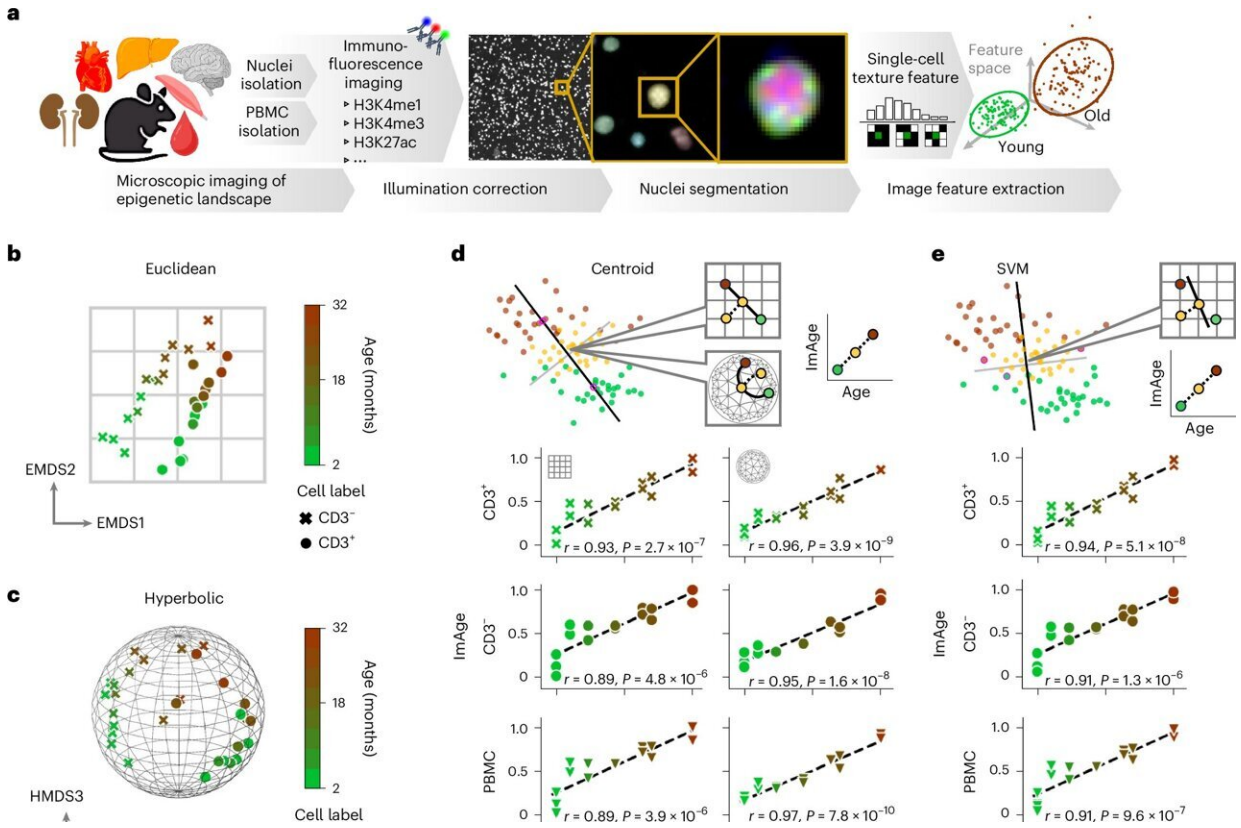
Imaging-based biomarker set to quantify aging at a cellular level

September 10 2024



Emergence of chromatin trajectories of aging. Credit: *Nature Aging* (2024). DOI: 10.1038/s43587-024-00685-1

An international team of scientists has developed a method to measure biological aging with unparalleled precision that has the potential to

change the way we approach aging and age-related diseases.

The research, published in *Nature Aging*, charts the development of ImAge, the first imaging-based biomarker capable of quantifying aging and rejuvenation at a single-cell level.

Study lead author postdoctoral research associate Dr. Kenta Ninomiya from The University of Western Australia and the Harry Perkins Institute of Medical Research said it offered a novel approach to understanding the aging process.

"ImAge works by analyzing the spatial organization of chromatin and epigenetic marks in individual cells," Dr. Ninomiya said.

"Unlike traditional methods that rely on chronological age, ImAge captures intrinsic age-related changes, providing a more accurate and reliable measure of biological age.

"By offering a detailed snapshot of cellular aging, we can better understand the effects of interventions such as caloric restriction and partial reprogramming, potentially paving the way for new strategies to extend healthy lifespan."

The study demonstrated that ImAge could detect changes in biological age in response to various interventions.

"For instance, the biomarker showed increased aging following chemotherapy treatment and decreased aging after caloric restriction or partial cellular reprogramming," Dr. Ninomiya said.

"Also, ImAge readouts from chronologically identical mice were found to inversely correlate with their locomotor activity, suggesting that this technique captures elements of both biological and functional age."

The international research team believes the innovative approach will have far-reaching implications for personalized medicine and age-related disease prevention.

"As the first imaging-based biomarker of aging with single-cell resolution, this is the first time we've been able to observe aging at such a granular level," Dr. Ninomiya said.

"ImAge sets the stage for future research into the mechanisms of aging and the development of novel therapeutic strategies aimed at enhancing longevity and improving human health."

More information: Martin Alvarez-Kuglen et al, ImAge quantitates aging and rejuvenation, *Nature Aging* (2024). DOI: 10.1038/s43587-024-00685-1

Provided by University of Western Australia