



Gauging Biological Age

The goal is to guide lifestyle changes that improve health.

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Age and health are clearly connected. Yet people of the same age can show vast differences in overall health. Some have chronic conditions by midlife, while others have a clean bill of health into their 70s and beyond.

One theory holds that such differences stem from variation in biological aging. This is the extent of damage that builds up across tissues and organs, leading to chronic conditions, physical decline and disability.

Existing measures of biological age, such as the Frailty Index, try to capture a person's health based on the number of health deficits they have. But these approaches don't fully capture the complexity of biological aging.

Researchers from the University of Washington School of Medicine and National Institute on Aging at the National Institutes of Health (NIH) wanted to develop a better way. Their method, called the Health Octo Tool, is described in *Nature Communications*.

To develop the tool, the team turned to data from multiple long-term studies that included more than 40,000 people. First, the researchers defined disease states and their severity for each of 13 major organ systems based on accepted medical criteria. These systems included cardiovascular, kidney, metabolic, gastrointestinal and liver, respiratory, thyroid, blood, oral health, bones and muscles, sensory and the central nervous system. The team also considered whether a person had a history of stroke or cancer.

The analysis of organ-specific disease was used to predict what the researchers call Bodily Organ-Specific Clocks. Then, by combining all the organ systems together, they created a measure, called the Body Clock, that captures a person's overall health state without regard to chronological age.

The team found that the Body Clock accurately predicted a person's performance on a short assessment used to gauge physical functioning, including balance, walking speed and strength. It also predicted disability and mortality with more than 90% accuracy. The Body Clock predicted health outcomes better than the Frailty Index.

The hope is that the Health Octo Tool will contribute to development of more effective lifestyle and health care strategies. Its use could suggest personalized interventions by identifying health declines early.

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