

Significant relationship between mortality and telomere length discovered

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A team of researchers at Kaiser Permanente and the University of California, San Francisco (UCSF) has identified a significant relationship between mortality and the length of telomeres, the stretches of DNA that protect the ends of chromosomes, according to a presentation on Nov. 8 at the American Society of Human Genetics 2012 meeting in San Francisco.

While a reduction in [telomere length](#) is regarded as a biomarker of aging, scientists have not yet determined whether it plays a direct causal role in aging-related health changes and mortality or is just a sign of aging.

In their prospective study of 100,000 multi-ethnic individuals whose average age was 63 years, the researchers determined that an association between telomere length and mortality existed and persisted even after the data were adjusted for such demographic and [behavioral factors](#) as education, smoking and alcohol consumption, said Catherine Schaefer, Ph.D., director of the Kaiser Permanente (KP) Research Program on Genes, Environment and Health (RPGEH).

Dr. Schaefer and Neil Risch, Ph.D., director of the UCSF Institute for Human Genetics, are [principal investigators](#) of the Genetic Epidemiology Research Study on Adult Health and Aging (GERA). UCSF professor and Nobel laureate Elizabeth Blackburn, Ph.D., led the research on telomere length measurement.

The telomere research, part of the GERA project, has genotyped over 675,000 markers of 100,000 KP Northern California patients and linked them with health data from their electronic medical records. To obtain DNA for genotyping and telomere measurement, the researchers collected saliva samples from the patients, who volunteered for the project and provided scientists with access to their electronic medical records.

Two years prior to the saliva collection, the researchers conducted a detailed survey of the patients' demographic and behavioral factors, providing a unique opportunity to address questions of telomere epidemiology and aging.

"With these data, we examined demographic relationships with telomere length, behavioral influences and relationship of telomere length with all causes of mortality following sample collection," said Dr. Schaefer. "Although we found that shorter-than-average telomeres were prospectively associated with mortality, only those with the shortest telomeres were at increased risk of death."

Dr. Risch added, "While this could indicate a direct effect of telomere length on health, it will also be important to examine the extent of pre-existing diseases in these individuals to understand their possible role in the biological connection between telomere length and longevity."

Dr. Risch said that he and the other scientists expected to and did find that telomere length was inversely correlated with age, and women had longer telomeres than men except as young adults. All analyses controlled for age and gender.

Harvard Medical School scientist Cynthia C. Morton, Ph.D., who was not involved in the study, commented, "The GERA study is especially impressive for the large resource of DNA samples and corresponding

[electronic medical records](#) available from KP patients, and for the outstanding group of scientists collaborating in the research.

"The intriguing findings on telomere length in the GERA cohort are no doubt among many yet forthcoming, prompting further investigations into the basis for ethnic differences in telomere length such as whether specific oral environmental exposures in ethnic groups might account for differences in telomere lengths in saliva DNA samples," added Dr. Morton, William Lambert Richardson Professor in Harvard's department of obstetrics, gynecology and reproductive biology.

Like several other investigations, GERA detected significantly longer telomeres among African Americans than other groups, but did not reveal a significant difference between European-Americans, Latinos and Asians.

According to the GERA results, telomere length was positively correlated with such factors as level of education and body mass index (BMI), and negatively correlated with cigarette smoking and [alcohol consumption](#). However, telomere length was not associated with major depression or stress-related disorders, although other studies have reported an association between telomere length and depression and stressful events.

Links between shorter telomeres and risks for cardiovascular disease, diabetes, some cancers, depression, pulmonary fibrosis, vascular dementia, osteoarthritis and osteoporosis have been detected by Dr. Blackburn, one of three scientists honored with the 2009 Nobel Prize in Physiology or Medicine, and her research group as well as other labs. Telomeres are special DNA sequences attached to the ends of each of the 46 chromosomes in human cells. When telomeres become too short, cells can no longer multiply.

More information: The researchers' presentation is titled "The Kaiser Permanente/UCSF Genetic Epidemiology Research Study on Adult Health and Aging: Demographic and Behavioral Influences on Telomeres and Relationship with All-cause Mortality."

Provided by American Society of Human Genetics

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