

Lifestyle Changes May Lengthen Telomeres, A Measure of Cell Aging

Diet, Meditation, Exercise Can Improve Key Element of Immune Cell Aging, UCSF Scientists Report

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By [Elizabeth Fernandez](#) on September 16, 2013

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A small pilot study shows for the first time that changes in diet, exercise, stress management and social support may result in longer telomeres, the parts of chromosomes that affect aging.

It is the first controlled trial to show that any intervention might lengthen telomeres over time.



The study will be published online on Sept. 16 in [The Lancet Oncology](#).

The study was conducted by scientists at UC San Francisco and the [Preventive Medicine Research Institute](#), a nonprofit public research institute in Sausalito, Calif. that investigates the effect of diet and lifestyle choices on health and disease. The researchers say they hope the results will inspire larger trials to test the validity of the findings.

“Our genes, and our telomeres, are not necessarily our fate,” said lead author [Dean Ornish](#), MD, UCSF clinical professor of medicine, and founder and president of the Preventive Medicine Research Institute.

“So often people think ‘Oh, I have bad genes, there’s nothing I can do about it,’” Ornish said. “But these findings indicate that telomeres may lengthen to the degree that people change how they live. Research indicates that longer telomeres are associated with fewer illnesses and longer life.”

Study of Early-Stage Prostate Cancer Patients

Telomeres are the protective caps on the ends of chromosomes that affect how quickly cells age. They are combinations of DNA and protein that protect the ends of chromosomes and help them remain stable. As they become shorter, and as their structural integrity weakens, the cells age and die quicker.

In recent years, shorter telomeres have become associated with a broad range of aging-related diseases, including many forms of cancer, stroke, vascular dementia, cardiovascular disease, obesity, osteoporosis and diabetes.

Lifestyle Changes May Lengthen Telomeres

A small UCSF pilot study shows for the first time that changes in diet, exercise, stress management and social support can result in longer telomeres, the parts of chromosomes that affect aging.

Here are some lifestyle changes undertaken by study participants:

1 DIET



High in whole foods, plant-based protein, fruits, vegetables; Low in fat (10% of calories) and refined carbohydrates

2 EXERCISE



Moderate aerobic exercise – walking 30 minutes per day for six days a week

3 STRESS MANAGEMENT



Gentle, yoga-based stretching, breathing or meditation for 60 minutes daily

4 INCREASED SOCIAL SUPPORT



Weekly support group sessions that included moderate exercise, stress management training and counseling

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For five years, the researchers followed 35 men with localized, early-stage prostate cancer to explore the relationship between comprehensive lifestyle changes, and telomere length and telomerase activity. All the men were engaged in active surveillance, which involves closely monitoring a patient's condition through screening and biopsies.

Ten of the patients embarked on lifestyle changes that included: a plant-based diet (high in fruits, vegetables and unrefined grains, and low in fat and refined carbohydrates); moderate exercise (walking 30 minutes a day, six days a week); stress reduction (gentle yoga-based stretching, breathing, meditation). They also participated in weekly group support.

They were compared to the other 25 study participants who were not asked to make major lifestyle changes.

The group that made the lifestyle changes experienced a “significant” increase in telomere length of approximately 10 percent. Further, the more people changed their behavior by adhering to the recommended lifestyle program, the more dramatic their improvements in telomere length, the scientists learned.

By contrast, the men in the control group who were not asked to alter their lifestyle had measurably shorter telomeres – nearly 3 percent shorter – when the five-year study ended. Telomere length usually decreases over time.

Possibilities for General Population

The researchers say the findings may not be limited to men with prostate cancer, and are likely to be relevant to the general population.

“We looked at telomeres in the participants’ blood, not their prostate tissue,” said Ornish.

The new study is a follow up to a similar, three-month pilot investigation in 2008 in which the same participants were asked to follow the same lifestyle program. After three months, the men in the initial study exhibited significantly increased telomerase activity. Telomerase is an enzyme that repairs and lengthens telomeres.

The new study was designed to determine if the lifestyle changes would affect telomere length and telomerase activity in these men over a longer time period.

“This was a breakthrough finding that needs to be confirmed by larger studies,” said co-senior author [Peter R. Carroll](#), MD, MPH, professor and chair of the UCSF Department of Urology.

“Telomere shortening increases the risk of a wide variety of chronic diseases,” Carroll said. “We believe that increases in telomere length may help to prevent these conditions and perhaps even lengthen lifespan.”

Other co-authors from UCSF include senior author and Nobel laureate [Elizabeth H. Blackburn](#), PhD, professor of biochemistry and biophysics; Jue Lin, PhD, associate research biochemist; [June M. Chan](#), DSc, associate professor of epidemiology & biostatistics; [Elissa Epel](#), PhD, associate professor of psychiatry; Mark Jesus M. Magbanua, associate specialist; [Jennifer Daubenmier](#) and [Nancy K. Hills](#), PhD, associate adjunct professors; and [Nita Chainani-Wu](#), DMD, MPH, PhD, assistant clinical professor.

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Jue Lin, Elissa Epel and Elizabeth Blackburn were co-founders of Telome Health Inc., a diagnostic company that assess telomere biology – THI had no relationship to this study. Dean Ornish works with Healthways, Inc. to educate and support people in making healthier behaviors. The other authors declared no conflicts of interest.

UCSF is a leading university dedicated to promoting health worldwide through advanced biomedical research, graduate-level education in the life sciences and health professions, and excellence in patient care. It includes top-ranked graduate schools of dentistry, medicine, nursing and pharmacy, a graduate division with nationally renowned programs in basic biomedical, translational and population sciences, as well as a preeminent biomedical research enterprise and two top-ranked hospitals, UCSF Medical Center and UCSF Benioff Children’s Hospital.

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