

Study confirms that stress helps speed aging Researchers uncover link to emotional strain

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Scientists have identified the first direct link between stress and aging, a finding that could explain why intense, long-term emotional strain can make people get sick and grow old before their time.

Chronic stress appears to hasten the shriveling of the tips of the bundles of genes inside cells, which shortens their life span and speeds the body's deterioration, according to a small, first-of-its-kind study involving mothers caring for chronically ill children.

If the findings are confirmed, they could provide the first explanation on a cellular level for the well-documented association between psychological stress and increased risk of physical disease, as well as the common perception that unrelenting emotional pressure accelerates the aging process.

"There is this deeply held belief that stress leads to premature aging. But there is no hard evidence for how this might happen," said Elissa Epel, a psychiatrist at the University of California at San Francisco (UCSF), who helped conduct the research. "This is the first time that psychological stress has been linked to a cellular indicator of aging in healthy people."

The findings could lead to new ways to detect the early physical effects of stress and monitor whether attempts to alleviate its effects are working, she said.

While cautioning that the findings need to be confirmed by additional research, other scientists said the results represent an unprecedented step in deciphering the intricacies of the mind-body connection.

"This is a real landmark observation," said Robert M. Sapolsky of Stanford University, who wrote a commentary accompanying the paper in today's issue of the Proceedings of the National Academy of Sciences. "This is a huge interdisciplinary leap . . . a great study."

Dennis H. Novack, who studies the link between emotions and health at Drexel University College of Medicine in Philadelphia, agreed.

'Mind and body'

"Everybody's trying to figure out what causes aging and premature aging. We all know that stress seems to age people -- just look at the aging of our presidents after four years," he said. The new study "demonstrated that there is no such thing as a separation of mind and body -- the very molecules in our bodies are responsive to our psychological environment."

Epel and her colleagues studied 39 women ages 20 to 50 who had been experiencing grinding stress for years because they were caring for a child suffering from a serious chronic illness, such as autism or cerebral palsy, and 19 other very similar women whose children were healthy.

The researchers examined structures inside cells called telomeres. Telomeres are the caps at the ends of chromosomes -- the molecules that carry genes. Every time a cell divides, telomeres get shorter. In the natural aging process, the telomeres eventually get so short that cells can no longer divide, and they then die.

***As more and more cells reach the end of their **telomeres** and die, the inexorable process produces the effects of aging -- muscles weaken, skin wrinkles, eyesight and hearing fade, organs fail, and thinking abilities diminish.

The researchers also measured levels of an enzyme called telomerase, which helps rebuild telomeres to stave off this process. Telomerase levels naturally decline with age.

"As the telomeres shorten, telomerase is trying to keep up," said Elizabeth Blackburn, a professor of biology and physiology at UCSF who helped conduct the study. "Over the long term, we lose the race and our telomeres do get shorter."

The researchers found that chronic stress appears to accelerate this process. The longer a woman had been caring for a sick child, the shorter her telomeres, the lower her levels of telomerase and the higher her levels of "oxidative stress." Oxidative stress is a process in which "free radicals" in the body damage DNA, including telomeres.

Perceived stress

A key factor appears to be people's perception of how much stress they are under, the researchers found. The greater a woman's perception of her stress in the study, the worse she scored on all these factors. Compared with women with the lowest levels of perceived stress, women with the highest perceived stress had telomeres equivalent to someone 10 years older, the researchers found.

"The shorter the telomeres, the higher the perceived stress and the lower the telomerase," Blackburn said. "It was just the same with oxidative stress -- the worse the perceived psychological stress, the greater the oxidative stress. It all went in the same direction."

The researchers studied telomeres and telomerase in white blood cells taken from blood samples. Prematurely aged white blood cells alone could make people more prone to illness because white blood cells are a key part of the immune system. But the findings probably hold true for other types of cells as well, Epel said, and the researchers now plan to do studies to confirm that.

It is unclear exactly how stress might affect telomeres and telomerase levels, but it could be that chronically elevated levels of stress hormones such as cortisol damage the telomeres and other genes in the body and lower telomerase levels, inhibiting the cells' ability to respond.

"That's the obvious hypothesis that jumps out," Blackburn said.

Whatever the mechanism, the findings indicate that doctors could monitor telomere length and telomerase levels for signs that people under chronic stress are suffering adverse effects, Epel said.

"Telomere length and telomerase may be used as a way to monitor health. Very low telomerase or very short telomeres might serve as a kind of red flag," Epel said.

If someone appears headed for trouble, doctors could recommend meditation, yoga or other stress-reduction techniques, she said.

"The findings emphasize the importance of managing life stress, to take it seriously if one feels stressed, to give your body a break, and make life changes that promote well-being," Epel said.

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