First sister study results reinforce the importance of healthy living

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Women who maintain a healthy weight and who have lower perceived stress may be less likely to have chromosome changes associated with aging than obese and stressed women, according to a pilot study that was part of the Sister Study. The long-term Sister Study is looking at the environmental and genetic characteristics of women whose sister had breast cancer to identify factors associated with developing breast cancer. This early pilot used baseline questionnaires and samples provided by participants when they joined the Sister Study.

Two recent papers published in *Cancer Epidemiology Biomarkers and Prevention* looked at the length of telomeres, or the repeating DNA sequences that cap the ends of a person's chromosomes. Telomere length is one of the many measures being looked at in the Sister Study. Telomeres protect the ends of chromosomes and buffer them against the loss of important genes during cell replication. Over the course of an individual's lifetime, telomeres shorten, gradually becoming so short that they can trigger cell death. The papers show that factors such as obesity and perceived stress may shorten telomeres and accelerate the aging process.

"Together these two studies reinforce the need to start a healthy lifestyle early and maintain it," said Linda Birnbaum, Ph.D., the director of the National Institute of Environmental Health Sciences (NIEHS), part of the National Institutes of Health. The researchers who published these papers are from the NIEHS which sponsors the Sister Study.

The papers are the first findings coming out of the Sister Study. The Sister Study is just completing its enrollment of 50,000 women aged 35-74 to prospectively study risk factors for breast cancer. "We anticipate a wealth of information to come out of the Sister Study," said Dale Sandler, Ph.D., chief of the Epidemiology Branch at NIEHS and principal investigator of the Sister Study. "Not only do we hope to find out more about the environmental and genetic factors that might lead to breast cancer, we also want to learn more about how factors such as stress, diet and exercise might impact cancer and other disease risks."

One of the studies published this week found that women who were obese for a long time had reduced telomere length. The researchers looked at the relationship between various measures of current and past body size and telomere length in 647 women enrolled in the Sister Study. They found that women who had an overweight or obese body mass index (BMI) before or during their 30s, and maintained that status since those years, had shorter telomeres than those who became overweight or obese after their 30s. "This suggests that duration of obesity may be more important than weight change per se, although other measures of overweight and obesity were also important," said Sangmi Kim, Ph.D., epidemiologist and lead author on the paper. "Our results support the hypothesis that obesity accelerates the aging process," said Kim.

The other paper published in February looked at the association between telomere length and the perceived stress levels of 647 women enrolled in the Sister Study, and found that similar to the obesity finding, stress can also impact telomere length. The researchers extracted DNA from blood drawn during initial enrollment to estimate telomere length, and measured levels of stress hormones in urine samples the women provided. Additionally, the researchers used a standardized scale to characterize levels of perceived stress based on answers to questions about how stressful participants perceived their life situations. In general, the researchers report that women in the Sister Study typically

reported low levels of perceived stress.

"Even so, women who reported above-average stress had somewhat shorter telomeres, but the difference in telomere length was most striking when we looked at the relationship between perceived stress and telomere length among women with the highest levels of stress hormones," said Christine Parks, Ph.D., an NIEHS epidemiologist and lead author on the paper. "Among women with both higher perceived stress and elevated levels of the stress hormone epinephrine, the difference in telomere length was equivalent to or greater than the effects of being obese, smoking or 10 years of aging."

The researchers also found that the effects of stress may be stronger in older women. They found that among women 55 years and older, those with higher perceived stress had 5 percent shorter telomeres than women with low stress levels. "More research is needed to determine if the shortening of telomeres in these women is related to aging or hormonal differences in the stress response, or simply represents the accumulated effects of stress across the lifespan," said Parks.

"These papers remind us that there are things people can do to modify their behavior and live healthier lives, such as maintain a healthy weight and cultivate healthy responses to stress," said Birnbaum.

More information:

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and Urinary Stress Hormones in Women. Cancer Epidemiology Biomarkers & Prevention 2009; 18(2): 551-560. February 2009.

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