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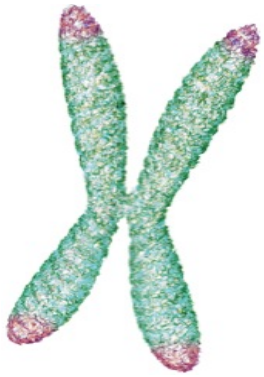
Telomere Length Linked to Fibromyalgia Pain

by Michael Vlessides



Washington—Considered a marker for biological aging linked to increased risk for morbidity and mortality, shortened leukocyte telomere length now has been associated with pain in fibromyalgia, researchers at the University of Michigan have found. The investigators also found that shortened telomere length was directly related to evoked pain sensitivity and altered brain structure, suggesting that pain may accelerate cellular aging.

"Telomeres are protein complexes that cap and protect the ends of chromosomes," said Afton L. Hassett, PsyD, associate research scientist in the Chronic Pain & Fatigue Research Center at the Ann Arbor institution. "Critically short telomeres put cells at risk for apoptosis and death.

"This is the first study to show that telomere length is associated with clinical pain alone, as well as experimental pain. I will also caution, however, that this was a highly exploratory study."

Feeling One's Biological Age

Telomere length has been associated with a variety of age-related illnesses, including cardiovascular disease, osteoarthritis, osteoporosis and several forms of cancer. Sex, race, socioeconomic status and even level of education appear to affect the length of a person's telomeres, as do behaviors and physical characteristics such as smoking, body mass index, stress and depression.

That suggests telomere length is a measure of biological as opposed to chronological age, Dr. Hassett said.

To determine the relationship, if any, between telomere length and pain, the researchers evaluated leukocyte telomere length in 66 women with fibromyalgia and 22 healthy female controls. All volunteers completed questionnaires including the Brief Pain Inventory (BPI; 0-10 scale) and the Center for Epidemiologic Studies Depression Scale (CESD). Twelve of the women with fibromyalgia underwent quantitative sensory testing and neuroimaging.

After controlling for age, pain was found to be associated with shorter telomere length ($r_{partial} = -0.267$; $P=0.039$), according to Dr. Hassett, who reported the findings at the 2012 annual meeting of the American Society of Anesthesiologists (abstract 012).

Patients were categorized as experiencing high levels of pain (BPI ≥5; n=30) or lower levels of pain (BPI<5; n=31). Women who scored at least a 5 on the BPI—the cutoff for "high" levels of pain—were more likely to have shorter telomeres regardless of their chronological age ($F=5.39$;$P=0.024$). "This difference," Dr. Hassett said, "represents approximately five years of aging." That estimate is based on a previous study that linked the deterioration of telomeres to time (*Proc Natl Acad Sci USA* 1998;95:5607-5610).

The researchers found no association between scores on the CESD and telomere length.

“We also wondered whether combining age and depression might have an additive effect,” Dr. Hassett continued. After adjusting for age, patients categorized as high pain/high depression had telomeres that were 265 base pairs shorter, on average, than those with low pain/low depression (P=0.043), a difference consistent with approximately six years of chronological aging.

In quantitative sensory testing, the researchers found a “very high correlation” between telomere length and sensitivity to pain that was statistically significant. “People with the shortest telomere lengths were by far the most sensitive to pain,” Dr. Hassett said.

Neuroimaging in a subset of 12 patients found that telomere length also was related to a person’s volume of gray matter. “We found that the fibromyalgia patients with shorter telomeres showed less brain matter volume in pain processing areas of the brain,” Dr. Hassett said.

Background Inflammation A Possible Explanation

Exactly why telomere length has such a significant association with these variables is open to interpretation, although Dr. Hassett offered a possible explanation. “The predominant theory is that decreases in cortisol levels may create an environment where there’s greater low-level inflammatory activity,” she said. “Ultimately, we would really like to verify these results in a larger study and even consider chronic pain patients with other diagnoses.”

W. Michael Hooten, MD, associate professor of anesthesiology at Mayo Clinic in Rochester, Minn., called the study fascinating. “This is a unique avenue of investigation that could broaden the understanding of the molecular mechanisms of chronic pain,” Dr. Hooten said. “It’s a relatively small sample, and it’ll be interesting to see how this plays out in a larger group of patients, to see if the findings can be replicated.

“It would also be interesting to determine if treatment of the underlying pain condition can halt or retard telomere shortening,” Dr. Hooten continued. “This could have important clinical implications. For example, if an association exists between treatment response and telomere length, this could help identify and measure the effectiveness of various interventions for fibromyalgia.”