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Telomere length affects colorectal cancer risk

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For the first time, researchers have found a link between long telomeres and an increased risk for colorectal cancer, according to research presented at the American Association for Cancer Research special conference on Colorectal Cancer: Biology to Therapy, held here Oct. 27-30, 2010.

Telomeres are small strips of DNA that cover the ends of chromosomes — they are similar to the plastic coverings on shoelace tips. They prevent chromosome tips from fraying during cell division. If the telomeres shorten, then cells age. Shortened telomeres have been associated with an increased risk of cancer development, said Lisa A. Boardman, M.D., associate professor of medicine, Mayo Clinic, Rochester, Minn.

Boardman and colleagues sought evidence of biological aging in people who develop colorectal cancer at a young age. The researchers hoped to determine what was causing these young patients to develop a disease that is typically associated with aging, she said.

"We anticipated that we would see some people who had young-onset colon cancer and shorter telomeres compared to people of the same age group who did not have cancer," said Boardman.

They were surprised, however, to find a group with longer telomeres.

"Even for people their age, their telomeres were longer than you'd expect for healthy people. This suggests that there may be two different

mechanisms that affect telomere length and that set up susceptibility to cancer," she said.

The researchers measured peripheral blood leukocyte DNA telomere length in 772 patients diagnosed with microsatellite stable colorectal cancer. Patients were younger than 60 years at diagnosis and had no history of chemo-radiotherapy. The researchers compared this group's telomere length with 1,660 nonrelated, age-matched, healthy controls.

Patients with the longest telomeres — those patients in the 95th percentile of telomere length — were 30 percent more likely to develop colorectal cancer than those in the 50th percentile, the results showed. Overall, the individuals with the shortest and the longest telomere lengths were at an increased risk for colorectal cancer, Boardman said.

These results indicate that there may be two distinct groups of colorectal cancer in young-onset patients. One that involves telomere shortening and this subset of young-onset of colorectal cancer patients may have accelerated aging. The other may be a distinct subgroup of patients with longer telomeres.

In future studies, researchers will examine the telomere maintenance genes in the peripheral blood DNA. In order to determine if these subsets of patients with younger-onset colorectal cancer have tumors that are mechanistically distinct, we are in the process of comparing the telomere lengths in the peripheral blood DNA with that in the tumor.

"It may be that if they truly go through different mechanisms in the development of cancer, then they may respond to different types of treatment and have a different molecular profile," said Boardman.

Provided by American Association for Cancer Research