

Abstract

J Nutr. 2009 Jul;139(7):1273-8.

Telomere Length in Peripheral Blood Mononuclear Cells Is Associated with Folate Status in Men.

Paul L, Cattaneo M, D'Angelo A, Sampietro F, Fermo I, Razzari C, Fontana G, Eugene N, Jacques PF, Selhub J.

Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University, Boston, MA 02111.

BACKGROUND: Human chromosomes are capped by telomeres, which consist of tandem repeats of DNA and associated proteins. The length of the telomeres is reduced with increasing cell divisions except when the enzyme telomerase is active, as in stem cells and germ cells. Telomere dysfunction has been associated with development of age-related pathologies, including cancer, cardiovascular disease, Alzheimer's disease, and Parkinson's disease. DNA damage in the telomeric region causes attrition of telomeres.

OBJECTIVE: Because folate provides precursors for nucleotide synthesis and thus affects the integrity of DNA, including that of the telomeric region, folate status has the potential to influence telomere length. Telomere length is epigenetically regulated by DNA methylation, which in turn could be modulated by folate status.

METHODS: In this study, we determined whether folate status and the 677C > T polymorphism of the methylene tetrahydrofolate reductase (MTHFR) gene are associated with the telomere length of peripheral blood mononuclear cells in healthy men.

RESULTS: The results of our study showed that plasma concentration of folate was associated with telomere length of peripheral blood mononuclear cells in a nonlinear manner. When plasma folate concentration was above the median, there was a positive relationship between folate and telomere length. In contrast, there was an inverse relationship between folate and telomere length when plasma folate concentration was below the median. The MTHFR 677C > T polymorphism was weakly associated ($P = 0.065$) with increased telomere length at below-median folate status.

CONCLUSION: We propose that folate status influences telomere length by affecting DNA integrity and the epigenetic regulation of telomere length through DNA methylation.

PMID: 19458030