

Is there a link between telomere length and cancer?

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Credit: AI-generated image ([disclaimer](#))

Telomeres are regions of repetitive DNA at the end of human chromosomes, which protect the end of the chromosome from damage. Whilst shorter telomeres are hypothesized biological markers of older age and have been linked to many diseases, including cancer and cardiovascular diseases, whether these associations are causal is

unknown.

A team from Bristol Population Health Science, a new specialist research institute at the University of Bristol, investigated the effect of longer telomeres on the risk of 83 diseases, including [cancer](#), cardiovascular diseases, diabetes, psychiatric diseases and autoimmune diseases in 420,081 cases and 1,093,105 controls, using a novel approach known as "Mendelian randomization".

The research team found that longer telomeres appeared to increase the risk for several cancers, including glioma, serous low-malignant-potential ovarian cancer, lung adenocarcinoma, neuroblastoma, bladder cancer, melanoma, testicular cancer, kidney cancer and endometrial cancer but to decrease the risk for [coronary heart disease](#), abdominal aortic aneurysm, coeliac [disease](#) and [interstitial lung disease](#).

Dr Philip Haycock, Cancer Research UK Population Research Fellow from the MRC Integrative Epidemiology Unit in the School of Social and Community Medicine and lead author, said: "These findings suggest that potential clinical applications based on telomere length may have to consider a trade-off in risk between cancer and other diseases. For example, a number of companies offer [telomere](#) length measurement services to the public, claiming that shorter telomeres are a general indicator of poorer health status and older biological age and that such information can be used to motivate healthy lifestyle choices in individuals. However, the conflicting direction of association between [telomere length](#) and risk of cancer and other diseases suggests that such services to the general public may be premature"

Dr Kathreena Kurian, Reader in Brain Tumour Research and Consultant Neuropathologist from the School of Clinical Sciences and co-author, added: "Our research has shown that having longer telomeres might increase the risk of some cancers, but reduce the risk for some non-

neoplastic diseases, including cardiovascular disease.

"In particular, having genetically-predicted longer telomeres appears to give the highest relative risk for the brain tumour glioma compared with other cancers. This is important because the risk factors for glioma are not well understood at the moment. Currently the well-recognised risk factors for glioma include having had previous radiotherapy and rare cancer genetic syndromes such as Li-Fraumeni syndrome."

The research suggests that it is likely that longer telomeres increase the risk for several cancers but reduce risk for other diseases, including cardiovascular diseases.

The study's approach could be useful for studying other hypothesized causes of human diseases. The research team has therefore created a freely available platform for other researchers called MR-Base, which can be used to support similar studies in future.

More information: Philip C. Haycock et al. Association Between Telomere Length and Risk of Cancer and Non-Neoplastic Diseases, *JAMA Oncology* (2017). [DOI: 10.1001/jamaoncol.2016.5945](https://doi.org/10.1001/jamaoncol.2016.5945)

Provided by University of Bristol

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