

Abstract

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The Association of Telomere Length and Cancer: a Meta-analysis.

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BACKGROUND: Telomeres shorten with each cell division and are essential for chromosomal stability. Short telomeres in surrogate tissues (e.g., blood cells) are associated with increased cancer risk in several case-control studies, but findings are inconsistent in prospective studies.

METHODS: We systematically reviewed studies published prior to August 30, 2010, on the association between telomere length (TL) in surrogate tissues and cancer. There were 27 reports on 13 cancers and/or incident cancer investigating this association. The majority, 16, were retrospective case-control studies, 11 were prospective studies. Meta-analyses were conducted to determine ORs and 95% CIs for these studies.

RESULTS: Studies on bladder, esophageal, gastric, head and neck, ovarian, renal, and overall incident cancer found associations between short telomeres and these cancers. Non-Hodgkin lymphoma, breast, lung, and colorectal cancer reports were inconsistent. Single studies on endometrial, prostate, and skin cancers were null. In a random-effects meta-analysis, short TL was significantly associated with cancer in retrospective studies (pooled OR for the shortest TL quartile compared with the longest: 2.9, 95% CI: 1.75-4.8, $P < 0.0001$). The pooled OR for prospective studies was 1.16 (95% CI: 0.87-1.54, $P = 0.32$). All studies combined yielded a pooled OR of 1.96 (95% CI: 1.37-2.81, $P = 0.0001$) for the association of short TL and cancer.

CONCLUSION AND IMPACT: There is suggestive evidence that short surrogate tissue TL is associated with cancer; the strongest evidence exists for bladder, esophageal, gastric, and renal cancers. Additional prospective studies with consistent methodology are needed to confirm this hypothesis.

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