TELOMERE LENGTH AND AGE AT DEATH IN VERY OLD INDIVIDUALS

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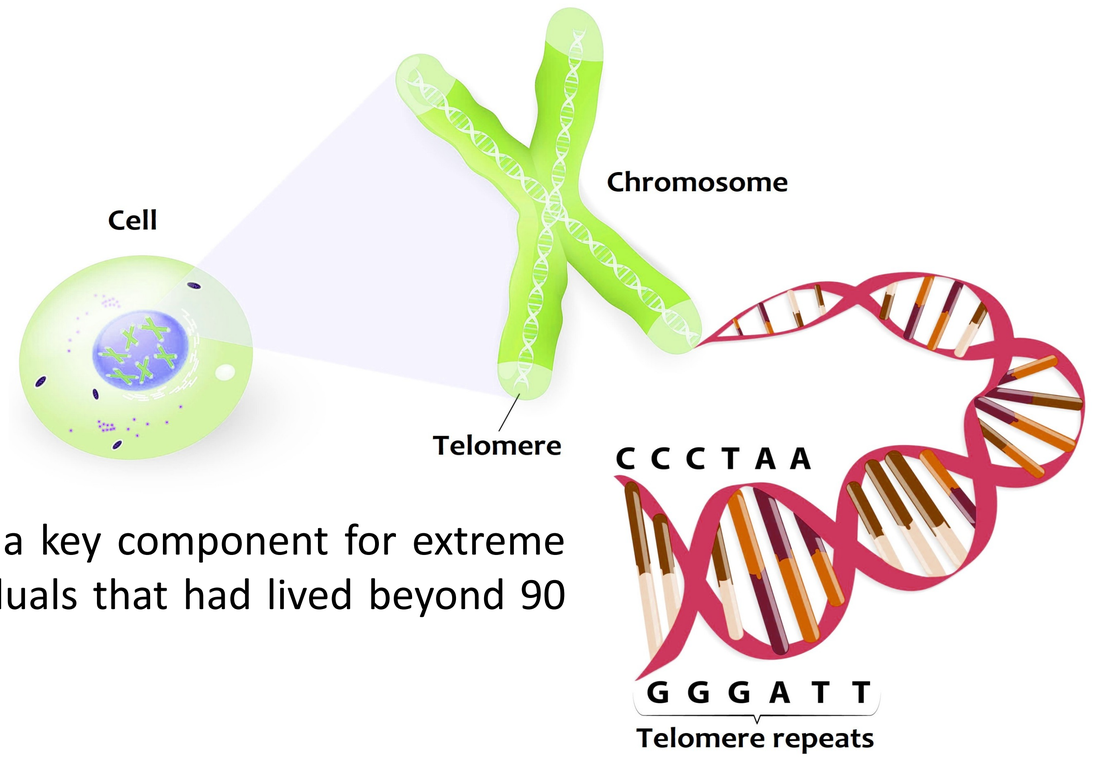
BACKGROUND

Many theories of ageing have been proposed, with one of the most widely supported being the theory of programmed ageing caused by the shortening of telomeres. Telomeres are repetitive sequences of DNA at the ends of the chromosomes that get shortened in every cell division. Shorter telomeres have been associated with an increased morbidity and mortality risk of many age-related diseases.

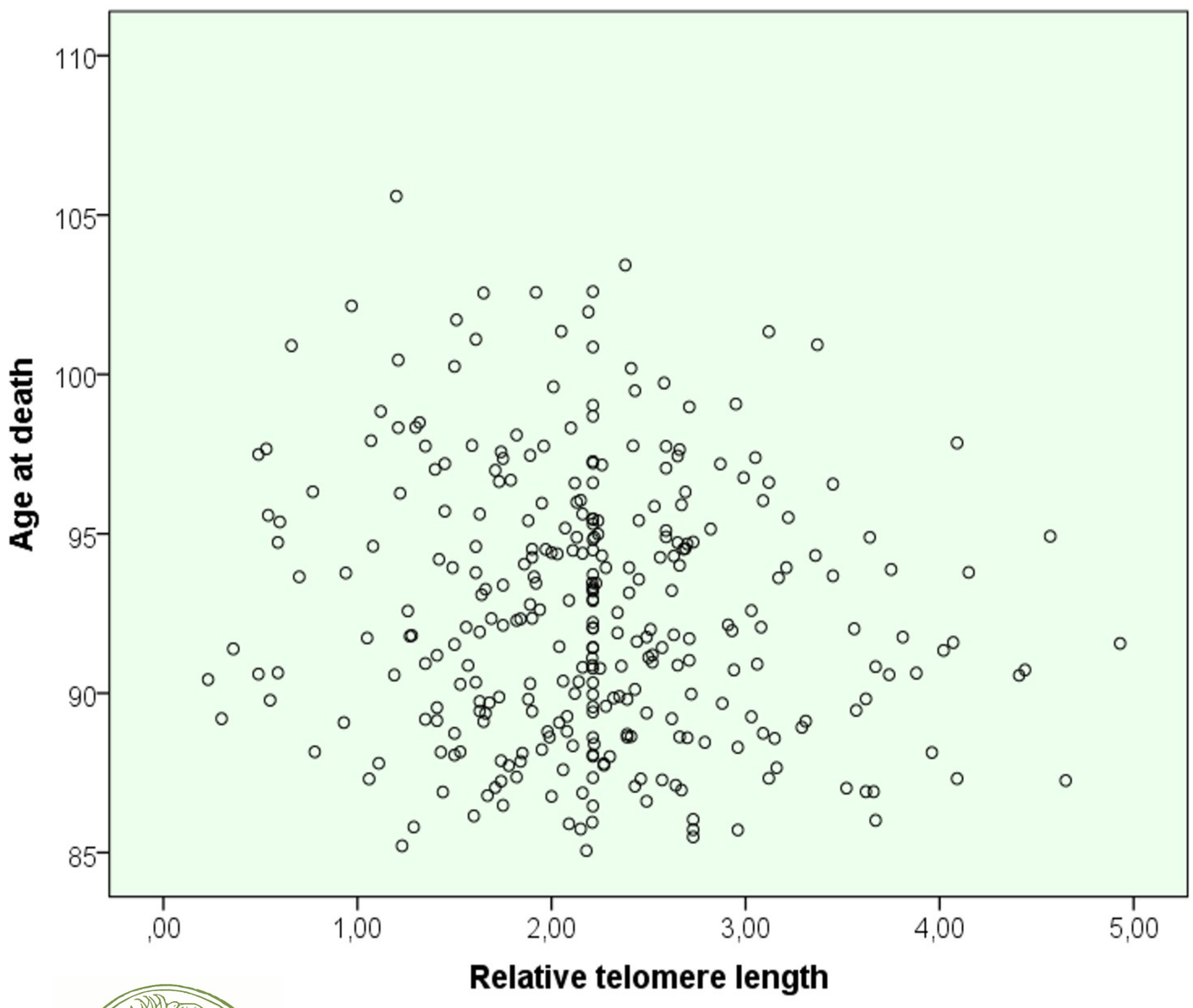


OBJECTIVE

Objective of this research was to determine whether telomere length is a key component for extreme longevity by comparing telomere lengths between truly long-lived individuals that had lived beyond 90 and 95 years of age, and individuals that died before reaching that age.

DESIGN

Relative telomere length (RTL) has been determined on DNA samples of 314 very old individuals (85+ years of age), with 100 young individuals (aged 20-35) as a referent sample. As the sample of the long-lived individuals was collected in the period between 2007 and 2009, age at death for each individual has been determined 10 years after the initial sampling. RTL was determined by a quantitative polymerase chain reaction. To determine RTL, two separate reactions were necessary – one in which specific primers were used to amplify the telomere repeats, and the other in which the primers were specific for a beta-globin gene, a gene with only one copy in the human genome. RTL was expressed as a factor by which each sample differed from a reference DNA sample in its ratio between amplified telomere DNA and amplified single copy gene DNA. This ratio is proportional to the average telomere length.



RESULTS

In this sample of long-lived Croatian individuals there is a statistically significant negative correlation between RTL and their age at death ($r=-0.114$; $p=0.043$). Binary logistic regression was performed to determine whether RTL could be used as a predictor for reaching either 90 or 95 years of age (an age considered a marker for extreme longevity). The results have shown that longer telomeres are a negative predictor for reaching 95 years of age ($Exp(B)=0.684$, $p=0.024$). These findings indicate that in an advanced age RTL is not a good biomarker of ageing and cannot be used as a predictor for achieving extreme longevity.

Figure 1. Scatter plot of the relation between relative telomere length in very old individuals and their age at death, showing a negative trend.

ACKNOWLEDGMENTS

This research was supported by the Croatian Science Foundation grant (CSF IP-01-2018-2497).

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