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EDITORIALS

Mediterranean diet and telomere length

Genetic factors may contribute to the link between Mediterranean diet and longer telomeres

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Interest in telomere biology has increased in recent years, both because of the quest for a reliable marker of biological ageing and because shorter telomeres in leucocytes have been shown to predict coronary heart disease (CHD).[1 2] The methodological challenges of measuring telomere length have caused some delays in the progress of telomere research,[3] but strong genetic arguments exist in favour of a more causal association between abnormalities in telomere biology and CHD.[4] Most studies on the link between telomere length and disease remain cross sectional in design, so considerations of cause and effect are difficult. Observational research using repeated measurement of telomere length is needed to calculate the telomere attrition rate. The rate at which telomeres shorten is thought to be an even better biomarker of the ageing process than just measuring telomere length once.

Genetic factors are important to our understanding of telomere biology and its role in risk of CHD, but we also know from many studies that lifestyle components are associated with both CHD risk and telomere length. For example, obesity, cigarette smoking, and consumption of sugar sweetened drinks have all been linked to shorter telomeres.[5 6]

In a new report from the Nurses' Health Study, Crous-Bou and colleagues (doi:10.1136/bmj.g6674) found a positive association between increased adherence to a Mediterranean dietary pattern and longer telomeres in a subsample of 4676 disease-free women who completed extensive food frequency questionnaires and also had a blood test to measure telomere length in leucocytes.[7] However, none of the individual dietary components was associated with telomere length, underlining the importance of examining dietary patterns in relation to health, not just separate dietary factors such as intake of whole grains. The authors estimate that the difference in telomere length for each one point change in the Mediterranean diet score corresponded to 1.5 years of ageing, on average.

Extensive dietary assessment is one merit of this study, along with the well described methods for measuring relative telomere length using quantitative polymerase chain reaction. Limitations include the cross sectional design, the women only cohort, and the lack of any validation of their quantitative polymerase chain reaction method against Southern blot, accepted by some researchers as the gold standard method for measuring telomere length.[3]

This is a well studied cohort of professional women, but notably lacking is an analysis of cardiovascular events, most importantly CHD events, in relation to telomere length. Previous reports found that women more adherent to a Mediterranean diet were less likely to develop both CHD and stroke and also had moderately better cognitive function.[8 9] However, others found that telomere length was not associated with risk of ischaemic stroke.[10]

Higher plasma 25-hydroxyvitamin D concentrations have been linked to longer telomeres in this cohort,[11] along with increased physical activity.[12] Other studies have reported a moderate association between telomere length and both dietary patterns and body composition.[13] Links clearly exist between telomere length and women's lifestyles in the broadest possible sense.

From these reports, a picture emerges that middle aged American nurses prone to eat a Mediterranean diet and to be more physically active, with a more favourable body composition and better vitamin D metabolism, tend to have longer telomeres after adjustment for important confounders. Women with longer telomeres may have environmental factors in common, but they may also share certain genetic influences. It is not too great a leap to speculate that women preferring a Mediterranean diet might have an ethnic and cultural background in immigrant populations from the Mediterranean. A study in young men has previously shown geographical variation in telomere length across European populations, with young men from Naples, Italy, characterised by shorter telomeres than corresponding men from other corners of Europe.[14] On the other hand, older men in Crete, Greece, another south European population, have longer telomeres than Dutch men from Zutphen, the Netherlands.[15] This could reflect genetic factors regulating telomere biology in populations with different ancestry and age range. Sex differences in telomere biology may also exist, and as yet we have no similar comparative data on telomere length across countries in women.

Ethnic differences in telomere length have been documented in the United States.[3] This suggests a potential for genetic factors to explain at least some of the variation in self reported dietary intake and lifestyle, as ancestry and cultural influences could

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play an important role in both how we live our lives and how lifestyle preferences such as dietary patterns are developed.

The new report from the Nurses' Health Study adds to the evidence from the same female cohort that longer telomeres are associated with a cluster of beneficial characteristics of healthy lifestyles and possibly even better cognition. A Mediterranean diet is the cornerstone of dietary advice in cardiovascular disease prevention, and the fact that it also links with a biomarker of slower ageing is reassuring. Ideally, we need similar data in men, but also analyses on prediction of coronary events in relation to telomere length among these nurses.

Studies measuring the attrition or shortening of telomeres over time would add important new information to cross sectional analyses. Genetic background factors, reflecting ancestry, could probably explain some of the variation in the association between dietary patterns and telomere length, and future studies on this question should take into account the possibility of interactions between genes, diet, and sex.

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