

BY LISA J. HUNT, D.O.

Biological aging is a complex phenomenon governed by multiple factors. Over the years, multiple hypotheses concerning aging have been proposed and tested. Thus far, no single hypothesis has fully explained the complex intricacies of biological aging. However, recent research has focused on telomere length as the best method to date for assessing biological aging. Telomeres are sections of genetic material at the end of each chromosome. Their primary function is to prevent chromosomal “fraying” when a cell replicates. As cells age, its telomeres become shorter. Over time, the telomeres become too short to allow the cell to reproduce and the cell stops dividing and ultimately dies. Thus, telomeres are functional complexes that are involved in maintaining genetic stability and in regulating cellular life span.

Telomere homeostasis is important to normal aging and to a wide range of disease states, including cancer, cardiovascular diseases, diabetes and age-related disorders (i.e. overall fragility, withered skin, etc.). As cells proliferate, telomeres progressively shorten. We now have the ability to measure telomere length using structural analysis of chromosomal change in the telomere. The measurement of telomere length has emerged as an important determinant of replicative senescence (where a cell is metabolically active but unable to repair damage or divide) and cell-fate. Therefore, for the first time, we have the ability to measure human biological age accurately, follow its progression, and actually intervene with various treatments that may slow the aging process in humans. The higher the telomere score is, the younger the cells are.

Telomere length has been implicated in several aspects of normal aging. Examples of conditions associated with shortening telomeres are: high levels of stress hormones, inflammation, insulin sensitivity/high blood sugar, smoking, poor diet, obesity and a sedentary lifestyle. As telomeres shorten with age, they are like “ticking genetic time clocks” in cells and cause various body systems to shut down. Included in the key systems affected by diminishing telomeres are the endocrine and immune systems. It is important to note that sometimes damage caused by age cannot be repaired by the body, as with deterioration of specific organs, joints or damaged cells.

Therapies directed at slowing the loss of telomere length may retard the aging process and/or age-related diseases.

An inflammatory diet that increases oxidative stress (one high in foods such as refined carbohydrates, fast foods, processed foods, sodas, artificial sweeteners, trans fats and saturated fats) will shorten telomere length faster. On the other hand, a diet with a large amount and variety of antioxidants that improves oxidative defense and reduces oxidative stress (one high in fresh/uncooked fruits and vegetables, fiber and omega 3's) will slow telomere shortening. In addition, caloric restriction, sleeping eight hours per night, stress reduction and regular exercise have also been shown to be protective of telomere length.

Finally, nutritional supplements can be helpful in maintaining telomere health. Specifically, a good antioxidant, a high quality balanced multivitamin, vitamin D, bioidentical hormone replacement therapy and a B complex vitamin may decrease the rate of telomere loss. *S_M*

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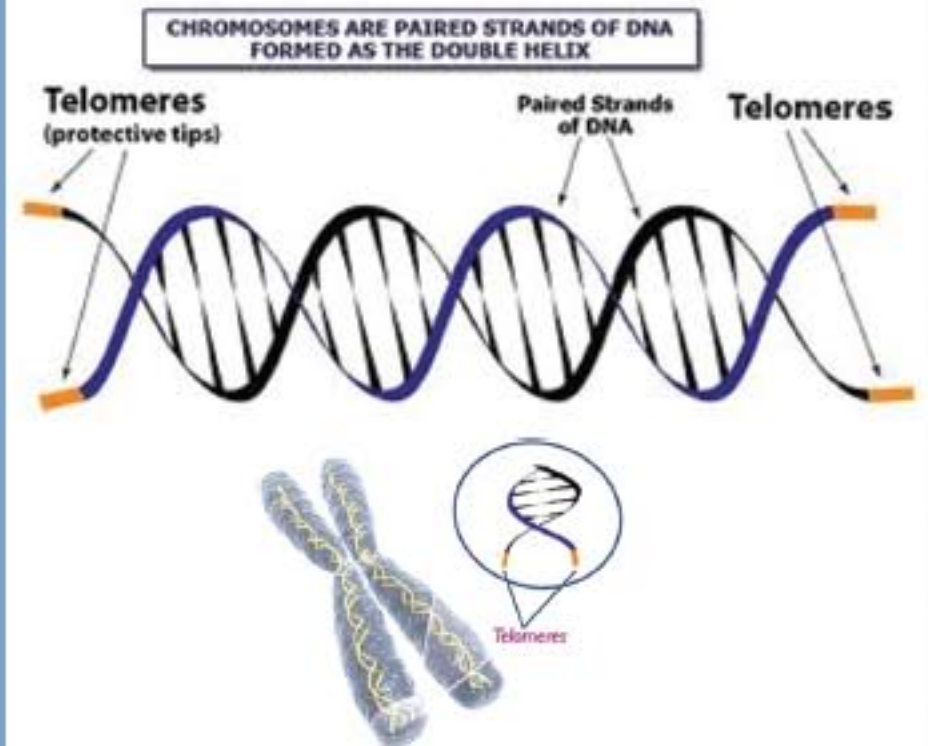
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