

**Soda and Cell Aging:
Associations Between Sugar-Sweetened Beverage Consumption and
Leukocyte Telomere Length in Healthy Adults From the National Health and
Nutrition Examination Surveys**

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- Cindy W. Leung, ScD, School of Medicine, University of California, San Francisco.
- Barbara A. Laraia, PhD, University of California, Berkeley.
- Belinda L. Needham, PhD, University of Michigan
- David H. Rehkopf, ScD, Stanford University
- Nancy E. Adler, PhD, School of Medicine, University of California, San Francisco.
- Jue Lin, PhD and •Elizabeth H. Blackburn, PhD, Department of Biochemistry and Biophysics, University of California, San Francisco. **Elizabeth Blackburn earned the 2009 Nobel Prize in Medicine/Physiology for her work on telomeres.**
- Elissa S. Epel, PhD, School of Medicine, University of California, San Francisco

KEY POINTS FROM THIS STUDY:

- 1) “Telomeres are the DNA-protein caps at the end of chromosomes that promote chromosomal stability and protect the genomic DNA from damage. Telomere length naturally shortens with each cell cycle, and if it falls to a critical short length, the cell is no longer able to divide and often malfunctions.”
- 2) Telomere shortness is linked to both biological age and to lifestyle behaviors and psychological stress.
- 3) Leukocyte telomere length is an important indicator of healthy cellular aging.
- 4) This study population used 5,309 adults aged 20 to 65 years, who had complete dietary data and leukocyte telomere length (LTL) measured in the 1999 to 2002. Those with a history of diabetes, coronary heart disease, angina, myocardial infarction, stroke or congestive heart failure were excluded.
- 5) “After adjustment for sociodemographic and health-related characteristics, sugar-sweetened soda consumption was associated with shorter telomeres.”
- 6) “Sugar-sweetened beverages (SSBs), including soft drinks or sodas, fruit-flavored drinks, sports drinks, and energy drinks, are the largest source of added sugar in the US diet.”
- 7) Paralleling the increased consumption of SSB is the increased prevalence of obesity and type-2 diabetes.

8) "Epidemiological studies have shown that regular consumption of SSBs is associated with increased risks of obesity, metabolic syndrome, type 2 diabetes, and cardiovascular disease."

9) Sugar Sweetened Beverages provide:

- Excess calories
- Lowered satiety
- High levels of insulin resistance
- Oxidative stress
- Inflammation

10) It is known that consumption of SSBs increases both oxidative stress and insulin resistance. "SSBs have been known to increase oxidative stress and systemic inflammation, which are both processes that can influence telomere attrition." "Oxidative stress, inflammation, and insulin resistance are also associated with telomere shortening."

11) "Shorter telomeres have been associated with increased risks of chronic diseases, including cardiovascular disease, diabetes, and some cancers."

12) LTL length was performed in the laboratory of Elizabeth Blackburn at the University of California, San Francisco, using the quantitative polymerase chain reaction method. This method is preferred over the Southern blot method.

13) RESULTS

- Shorter telomeres are linearly associated with older age.
- Mean telomere length was longest in never smokers.
- Mean telomere length was longer in adults of normal weight.

14) "In this nationally representative sample of healthy adults, the average daily consumption of sugar-sweetened soda was 12 ounces (1.5 servings), a level in excess of the American Heart Association recommended limit for added sugar."

15) "Each daily 8-ounce serving of sugar-sweetened sodas was linearly associated with shorter telomeres, roughly equivalent to 1.9 additional years of aging, independent of sociodemographic characteristics and health-related variables."

[Key Point: essentially, for each 8 oz. of sugary soda consumption accelerated aging by about 2 years].

16) "For a daily 20-ounce serving, the current standard serving size, this translates into approximately 4.6 additional years of aging." **[Wow!]** "More than 20% of adults in the study population reported at least 20 ounces of sugar-sweetened soda consumption per day."

17) This is the "first study to link sugar-sweetened soda consumption with telomere length in a large, nationally representative sample of healthy adults."

- 18) Moderate or vigorous of physical activity increases telomere length by 4.4 years.
- 19) Smoking reduces telomere length by 4.6 years.
- 20) High SSB intake leads to rapid caloric and fructose intake, and high glycemic load. This results in an increased risk of metabolic risk factors and a biochemical environment of high insulin resistance, oxidative stress, and inflammation.
- 21) "Our results suggested that another link between sugar-sweetened soda consumption and metabolic disease might be through shortened telomere length, a biomarker and mechanism of cellular aging."
- 22) These authors suggest that the higher the sugar consumption the greater the loss of telomere length. **[Important]**
- 23) "Decreasing consumption of SSBs to reduce risks of obesity-related chronic disease seems prudent."
- 24) This "study results suggested that regular consumption of sugar-sweetened sodas was associated with significantly shorter telomeres."
- 25) "There is sufficient evidence to limit our consumption of all SSBs to improve cardiometabolic risk factors, reduce chronic disease risk, and improve overall health."
- 26) "Our study supported a new link, shortened immune cell telomere length, which is a biological risk factor for aging, between sugar-sweetened soda consumption and metabolic disease." **[Key Point]**

COMMENTS FROM DAN MURPHY:

Accelerated cell aging can be assessed by measuring telomere length (Elizabeth Blackburn, 2009 Nobel Prize in Medicine/Physiology).

Three of the authors of this article own a company that measures telomere length, Telomere Diagnostics Inc., (Epel, Lin, Blackburn).

Smokers shorten their telomeres by 4.6 years. Ironically this is the same effect as consuming 20 oz. of sugar sodas per day, noting that in terms of cellular aging, drinking 20 oz. of sugary soda per day is just as bad as smoking.

Regular exercise lengthened telomeres by 4.4 years.