

## Live Longer By Reducing Oxidative Stress

Oxidative stress occurs when certain lifestyle factors damage our body cells, and is at the route of most serious diseases, including cancer. "Oxidative stress is likely to be involved in age-related development of cancer" (source: Wikipedia). It is widely accepted by medical scientists that oxidative stress is a major cause of premature aging and a shortened lifespan.

Oxidation occurs when oxygen damages (oxidizes) the molecular components of body cells. Antioxidants are molecules inside the body that inhibit (prevent) the damaging oxidation of other molecules such as free radicals.

So put simply, oxidative stress occurs when our body cells are damaged by free radicals. Oxidative stress is a fact of life. It's estimated that our bodies' cells are "hit" by free radicals up to 10,000 times a day, every day. What causes oxidative stress? Daily living – breathing, eating, exercise, and exposure to environmental toxins.

As we breathe, we take in oxygen which our cells require. Our cells then naturally produce unstable molecules as a by-product, and these are known as 'free radicals'. When these free radicals are not stabilized they can cause oxidative damage to our cells and to our DNA (similar to the oxidative damage that rusts metal, or causes the browning of a cut apple).



Oxidative stress also occurs from exposure to tobacco smoke, the sun, poor diet, processed meats, trans fats, pollution, drugs, toxins, herbicides, body trauma, and some medical tests and procedures such as x-rays, surgeries and chemotherapy. Antioxidants inside the body protect cells by stabilizing free radicals, thus preventing and repairing the damage that they can cause.

Every time oxidative stress damages a body cell, the telomere associated with that cell is shortened as explained in the previous chapter. So long-term you always want to minimize your telomere damage, and short-term you always want to avoid oxidative stress so as to avoid illness and bad health.

Our natural antioxidant defenses generally do a great job in keeping infection at bay and combating a host of diseases such as heart disease, stroke, macular degeneration, diabetes and cancer.

We can give our antioxidant defenses a helping hand by following a healthy diet and by avoiding unhealthy lifestyles that generate free radicals inside the body. Antioxidants are abundantly found in brightly colored fruits and vegetables, as well as in nuts, seeds, sprouted seeds and green tea. They are

also present in small amounts in just about everything we eat: all fruits, vegetables, and legumes contain antioxidants, and some grains, meats, poultry and fish contain smaller amounts.

Until recently, the thinking had been that antioxidants can only be good for you and that free radicals can only be bad. But that thinking has changed.

Drs. Clea Villanueva and Robert Kross published a 2012 review titled 'Antioxidant-induced Stress' in the International Journal of Molecular Sciences. Their research and other recent studies show that free-radicals are not all bad and that antioxidants are not all good. It's not a black and white picture.

For example, free-radicals are a natural by-product of energy production inside the body. Such free-radicals signal our body cells to make their own home-made antioxidants of many types. These antioxidants then work together synergistically in a kind of cascade effect to protect the whole body.

If there is only one overwhelming type of antioxidant present, say as a result of taking a high-dose vitamin C supplement, then our body's natural antioxidants 'don't get a look in' to provide that protective cascade effect. You could end up with a bunch of reactive vitamin C, which itself can cause what is called "antioxidant stress."

We do need these endogenous antioxidants that our own body makes. They are very important for good health generally. But we don't need antioxidants from the food we eat and we certainly don't need antioxidant supplements. "Evidence gathered over the past few years shows that, at best, antioxidant supplements do little or nothing to benefit our health. At worst, large doses could have the opposite effect, promoting the very problems they are supposed to stamp out. Time and again antioxidant supplements have failed the test. True, they knock the wind out of free radicals in a test tube. But once inside the human body, they seem strangely powerless". Source: Readers Digest Canada, [www.readersdigest.ca/food/diet-nutrition/antioxidantmyth](http://www.readersdigest.ca/food/diet-nutrition/antioxidantmyth).

"A trial in 2011 with 35,500 men found that men older than 50 years of age had a 17% higher risk for prostate cancer when given large doses of the antioxidant vitamin E. Due to these disturbing studies, conclusions point to the possibility that antioxidants at least at high doses may protect cancer cells from free radicals. A recent study gave the antioxidant N-acetylcysteine (NAC) to mice genetically susceptible to melanoma. In this trial, the dose was similar to those found in human consumption of antioxidants. The treated mice developed more tumors in lymph nodes that suggested a higher rate of metastasis (spread of cancer). In addition, they added NAC or vitamin E to cultured human melanoma cells and found that antioxidants aided the cell's ability to invade nearby tissues (a sign of increased metastasis). Do not fall for the hype of supplement sellers and manufacturers who ignore the science". Source: Sally J. Feltner, PhD, RDN (University Professor and PhD degree in nutrition science), Antioxidant Supplements and Cancer Cells, article at [foodworkblog](http://foodworkblog), Jan. 2016.

"Diets containing foods [naturally] high in antioxidants have been shown to improve health. However, in supplement form, the prevention of diseases such as cancer or coronary heart disease and the general promotion of health have not been confirmed experimentally. Trials including supplements of beta-carotene, vitamin A, and vitamin E singly or in different combinations found no effect on mortality or might increase it. Randomized clinical trials of taking antioxidants including beta-carotene, vitamin E, vitamin C and selenium have shown no effect on cancer risk or have increased cancer

risk. Supplementation with selenium or vitamin E does not reduce the risk of cardiovascular disease."  
Source: Wikipedia.



"The conclusion is becoming clear: whatever is behind the health benefits of a diet rich in fruit and vegetables, you can't reproduce it by taking purified extracts or vitamin supplements. Just because a food with a certain compound in it is beneficial to health, it does not mean a [pill containing the same compound] is." Source: Paul Coates, Office of Dietary Supplements, National Institutes of Health, <https://ods.od.nih.gov>.

"The truth is that there are no studies that prove that plant antioxidants work as antioxidants in our non-plant bodies. After all, they were made for plants, and many of them are destroyed by digestion or transformed by the liver into completely different chemicals. Luckily, Nature, in its infinite wisdom, provided us with our own built-in antioxidants, designed especially for our animal bodies, such as cholesterol, melatonin, urea, and uric acid". Source: Georgia Ede, MD, [www.diagnosisdiet.com](http://www.diagnosisdiet.com)

The fact is our own human body makes all the antioxidants that it needs for good health. It could be that some of the antioxidants contained in our food can give the body a helping hand in making its own antioxidants (but there is no scientific evidence to back this up). The latest research is showing that the body does not use the antioxidants contained in the food we eat to combat free-radicals. The body makes its own antioxidants for such battles. But this does not mean or imply that foods naturally high in antioxidants are not healthy to consume (they typically contain a wide range of nutrients that are good for you).

When it comes to antioxidant supplements, a dire picture is emerging from the research. A 2014 review published in 'Nutrition and Food Science' concluded that high-dose antioxidant supplements can effectively snatch up all the free-radicals naturally produced by the body before they have a chance to trigger the synthesis of those beneficial endogenous antioxidants.

Barbara Demmig-Adams, professor of ecology and evolutionary biology at the University of Colorado in Boulder, and one of the authors of the 2014 paper wrote in an email:

"I think it's a really important realization that the much-maligned [free] radicals have a job to do in our bodies and that a single high-dose supplements can do more harm than good".

In particular, you should avoid the antioxidant supplements A, C, and E. These vitamins are easily obtained from the food you eat, particularly fruit, vegetables and salads. Taking these vitamins as supplements causes nothing but ill-health.

Put simply: taking antioxidant supplements puts your health at risk. Our cells practice an elegant balancing act, each component playing an important part: vitamins, minerals, electrolytes, water, free-

radicals, other metabolites, and antioxidants (both endogenous and dietary). When we figure out a specific beneficial role that any one of these serves, it's tempting to say: "Wow, look how important this thing is, let's make sure folks get a whole bunch of it!" But that can throw off the whole delicate system, leading to some serious consequences.

For example, research is now showing that antioxidant supplements may actually speed up the spread of the potentially deadly skin cancer melanoma. Such supplements can prevent oxidation (i.e. prevent efficient energy production) which in turn can damage cells, leading to cancer.

What about taking other vitamin and mineral supplements? In general, you should avoid taking such supplements unless prescribed for a specific medical condition. A healthy diet will provide all the vitamins and minerals needed for optimum health and longevity. The only exception to this is as follows: it is recommended that you take three daily vitamins B12, D3 and K2(MK7) as research shows that however good the diet, these three vitamins are lacking in most people.

Note: take both D3 and K2(MK7), or neither. The body needs D3, but it also needs K2 (MK7) to tell the body where to put the D3. If you take D3 without K2(MK7) you risk a build-up of harmful arterial calcification plus insufficient D3 where it is needed.

"Without Vitamin K2, the body cannot direct calcium to the bones where it's needed; instead, the calcium resides in soft tissue (like the arteries)—leading to a combination of osteoporosis and atherosclerosis". Source: Kate Rheaume-Bleue, *Vitamin K2 and the Calcium Paradox: How a Little-Known Vitamin Could Save Your Life*, Wiley, ISBN: 9781118065723, 2011.

It is well known that free-radicals can damage healthy body cells. But free-radicals can also damage harmful microorganisms like viruses and bacteria which have invaded our bodies. We need the free-radicals that our body naturally produces when we burn energy; they are part of our natural defenses against illness and disease. If we wipe them out with antioxidant supplements, we also wipe out a major part of our natural defenses.

Furthermore, it is becoming clear that the free-radicals that we naturally produce cause minimum damage to healthy body cells, just enough to make such cells produce vital 'home-made' antioxidants.



Clearly, it is important to avoid smoking, air pollution, sun burn, harmful drugs, alcohol, and other substances that give the body an overdose of harmful free-radicals. They can cause cellular damage associated with ageing, heart failure, cancer, Alzheimer's, and many other health problems. But it doesn't follow that taking antioxidant supplements will help combat such free-radicals. You combat such free-radicals by avoiding the harmful substances (and unhealthy behaviors) in the first place.

While some studies show that antioxidant supplements in the laboratory can prevent cancer, others show that they keep cancer cells alive so as to proliferate. Cells alone on a plate in a lab respond consistently well to antioxidants, but cells in the body are more complicated.



Let us not forget that there is a huge multi-billion dollar food and supplement industry that is always pushing us to buy their antioxidant pills, potions, and health foods. Don't be conned into buying a health-food processed and packaged as being 'high in antioxidants'. We simply don't need these snake-oil remedies. You don't want to (and don't need to) boost the antioxidant capabilities of your body with antioxidant supplements. But you do need to keep your natural immunity strong so as to fight off disease and illness. You do this by adopting a wholly nutritious diet that equips the body to make its own endogenous antioxidants. So-called 'superfoods' high in antioxidants such as blueberries are indeed good for you, but they can't be used as a cancer-fighting antioxidant weapon.

A major review published in 2012 looked at over 60 studies associated with oxidative stress and its effect on health and longevity, and came to the conclusions that follow. Note: Comments in brackets [ ] are the author's. Source: Masood A. Shamas, et al, Telomeres, lifestyle, cancer, and aging, *Curr Opin Clin Nutr Metab Care*. 2011 Jan; 14(1): 28–34.

1. There has been growing evidence that lifestyle factors may affect the health and lifespan of an individual by affecting telomere length. Recent studies indicate that telomere length, which can be affected by various lifestyle factors, can affect the pace of aging and onset of age-associated diseases. Telomere length shortens with age. Better choice of diet and [healthier lifestyle] activities have great potential to reduce the rate of telomere shortening, leading to delayed onset of age-associated diseases and increased lifespan. Several studies indicate that shorter telomeres are a risk factor for cancer.
2. Coronary heart disease and premature aging: shorter telomeres and is associated with premature greying, predisposition to cancer, vulnerability to infections, progressive bone marrow failure, and premature death in adults.

3. Smoking increases oxidative stress, expedites telomere shortening, and may increase the pace of the aging process.

4. The excessive loss of telomeres in obese individuals was calculated to be equivalent to 8.8 years of life, an effect which seems to be worse than smoking. Together these data indicate that obesity has a negative impact on telomeres and may unnecessarily expedite the process of aging.

5. Environment, nature of profession, and stress can also affect the rate of telomere shortening and health.

6. Stress increases the pace of telomere shortening and aging. [The research shows that] women exposed to stress in their daily life [have] increased oxidative pressure, reduced telomerase activity, and shorter telomeres relative to the women in the control group. Importantly, the difference in telomere length in these two groups of women was equivalent to 10 years of life, indicating that the women under stress were at a risk for early onset of age-related health problems.

7. What we eat and how much we eat can significantly affect our telomeres, health, and longevity. Consistently, the highest life expectancy of Japanese is associated with low [dietary] protein and high-carbohydrate intake in diet.

8. Dietary intake of antioxidants reduces the rate of telomere shortening [this refers to the food you eat (not supplements) and the beneficial effect is likely to be from the overall nutritional content of the food rather than from the antioxidants in the food per se].

9. Dietary restriction [rather than calorie restriction] reduces the pace of aging. It has been shown that dietary restriction in rodents delays the onset of age-associated diseases and increases the lifespan. Rats subjected to a protein-restricted diet early in life displayed a long-term suppression of appetite....and increased lifespan.

10. Exercise may preserve telomeres and reduce the pace of aging. [Research shows that] the duration of exercise inversely correlates with biomarkers for damage to DNA and telomeres. Exercise can reduce harmful fat and help mobilize waste products for faster elimination, leading to reduced oxidative stress and preservation of DNA and telomeres. Consistently, athletes had elevated telomerase activity and reduced telomere shortening relative to non-athletes. [This research shows that sedentary people - couch potatoes - have shorter telomeres compared to those who are physically active in some manner].

11. Exercise seems to be associated with reduced oxidative stress and elevated expression of telomere stabilizing proteins and may therefore reduce the pace of aging and age associated diseases. [This conclusion is drawn from research that involved testing subjects who did three weeks of voluntary, unsupervised exercise].

Author's note relating to above point 11: Another meta review concludes that no intense exercise and physical activity reduces the rate of telomere shortening and that in contrast, intense exercise can lead to transient increases in single stranded DNA breaks in peripheral blood cells, thus shortening telomeres. Source: Zhangfa Song, Lifestyle impacts on the aging associated expression of biomarkers of DNA damage and telomere dysfunction in human blood, *Aging Cell*, 2010 Aug; 9(4): 607–615).

12. Telomeres shorten with age and progressive telomere shortening leads to [body cell death]. Older people with shorter telomeres have three to eight times increased risk to die from heart and infectious diseases. Rate of telomere shortening is therefore critical to an individual's health and pace of aging.

13. Smoking, exposure to pollution, a lack of physical activity, obesity, stress, and an unhealthy diet increase oxidative burden and the rate of telomere shortening.

14. Key points [made by this Masood A. Shamma's review]: Telomere length shortens with age. Rate of telomere shortening may indicate the pace of aging. Lifestyle factors such as smoking, lack of physical activity, obesity, stress, exposure to pollution, etc. can potentially increase the rate of telomere shortening, cancer risk, and pace of aging. [A healthy] diet and regular exercise [i.e. physical activity] can potentially reduce the rate of telomere shortening, disease risk, and pace of aging.

To finish on the subject of oxidative stress, there is a strong and well-researched link between sleep and oxidative stress. When you get enough sleep, this greatly restores the body from the previous day's oxidative stress and minimizes the oxidative stress in the coming day. You are urged to search Internet for the term "sleep well" for ideas and tips on how to improve your sleep quota.



**Summary: Avoid oxidative stress in your body so as to be healthy and live longer. Limit nutritional supplements to vitamins D3, K2 and B12, unless other supplements medically prescribed.**

Source: The Science of Longevity by Russell Eaton.

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