

Understanding Oxidative Stress

Like an apple turns brown when exposed to air, our cells can “rust” when we breathe due to oxidative stress, a process caused by free radicals.

Free radicals are unstable molecules that damage or “oxidize” cells throughout the body in a process called oxidative stress. Over time, oxidative stress can leave our cells and tissues unable to function properly.

This leads to damaged tissue, damaged DNA, and damaged cell membranes; this is the cause of most of our chronic diseases.

Because free radicals contribute to disease (hardened arteries, cancer, diabetes, etc) they’re often intertwined with the health problems we experience with age. Avoiding the causes of free radicals and adopting a lifestyle that helps you fight back against them can help you safeguard your health by preventing oxidative stress.

What Causes Free Radicals?

Free radicals are a byproduct of energy consumption in our mitochondria, the factories that produce energy in each of our cells. As we breathe, we can’t help but make some free radicals, but many other factors in your lifestyle and environment can also contribute to their production, like:

- **Eating too many calories, sugars and/or refined carbohydrates.** When we eat more, our mitochondria release more “exhaust,” creating higher levels of free radicals as they burn fuel from food for energy.
- **Exercising too much or too little.** Exercise is an important part of any healthy lifestyle, but too much can increase oxidative stress in our bodies. In general, more than 60 minutes per day is considered excessive, while less than 30 minutes five times a week is not enough.
- **Excessive alcohol consumption.** Drinking alcohol increases your levels of cytokines, inflammatory molecules that are linked to oxidative stress.
- **Exposure to tobacco smoke.** Tobacco smoke contains more than 4,000 toxic chemicals that lead to oxidative stress.
- **Exposure to air pollutants.** Allergens and industrial pollution increase oxidation in our bodies.
- **Excessive stress.** Stress and the stress hormone cortisol increase inflammation, which further increases free radical production.
- **Ionizing radiation.** Exposure to the sun, x-rays, radon, hair dryers, cellphones, airplanes, electric blankets and waterbed heaters can contribute to oxidative stress.
- **Eating charbroiled foods.** These contain polycyclic aromatic hydrocarbons, which can contribute to oxidative stress.
- **Exposure to fungal toxins.** Environmental molds (like those in bathrooms and basements) and internal molds and fungi (those related to your gut) can produce toxins that increase oxidative stress.

- **Poor liver and gut detoxification.** When the liver becomes overwhelmed with toxins from food (like when you eat too much sugar) or the environment (like exposure to pesticides or mercury), it becomes inflamed and produces more free radicals.
- **Chronic infections.** Dental infections and chlamydia can cause hidden infections that contribute to oxidative stress.
- **Lack of sleep.** Sleep deprivation increases oxidation.

How Can You Prevent Oxidative Stress?

Preventing oxidative stress can begin by avoiding the causes of free radicals above. You can also prevent free radical formation and control oxidative stress by:

- 1. Improving your breathing and oxygenation.** This will help your body flush out toxins, free radicals and inflammatory molecules.
- 2. Eating foods that reduce oxidation.** Many foods contain antioxidants (like vitamins, minerals, phytonutrients and polyphenols) that are major factors in protecting us from free radical damage. To avoid oxidative stress and inflammation, it's important to eat a diet full of many different colorful fruits and vegetables that contain these antioxidants. A nutrient-poor, calorie-rich, high glycemic, antioxidant-deficient diet should be avoided.
- 3. Using herbs.** Some herbs can help us reduce oxidation, like:
 - Ginkgo
 - Ginger
 - Green tea polyphenols
 - Milk thistle
 - Pycnogenol or grape seed extract
 - Rosemary
 - Turmeric
- 4. Using supplements.** Certain supplements can be especially useful at fighting free radical production, including:
 - N-acetylcysteine. This will boost production of glutathione, an important antioxidant and detoxifier.
 - Alpha lipoic acid. This is a major antioxidant that reduces blood sugar levels and helps to improve energy production in the mitochondria.
 - Coenzyme Q10 (CoQ10). This is an antioxidant that is also important for the mitochondria.
 - NADH. This is important to the cycle of energy production in the mitochondria.

5. Testing and Treatment

A Functional Medicine practitioner can help you assess the damage caused by oxidative stress by examining the DNA damaged by free radicals and testing for levels of antioxidants like CoQ10 and others, in the blood. This approach has not been taught to your traditional doctors, they generally will not test at this level. But, it is this deep physiologic level where subtle changes make big improvements to prevent and treat disease in your body.