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# The Antioxidant Army – Understanding How We Can Fight Off Free Radicals and Oxidative Stress

Antioxidants – a term that is thrown around loosely in health food stores, grocery stores and pharmacies a like. But what exactly is an antioxidant, and what are they doing for me? I hope to shed some light into the great abise and break it down nice and slowly so we can all have a good base, core understanding of what these little guys mean for our health.

## What exactly is an antioxidant?

Antioxidants, simply put, are compounds that neutralize reactive and highly destructive molecules known as free radicals (also known as pro-oxidants). An accumulation of free radicals can lead to oxidative stress. It is fun to think of antioxidants as a superhero and free radicals as the disgusting evil villain that everyone despises. Too many evil villains (free radicals) leads to chaos (oxidative stress) in your body.\*some quantities of free radicals are vital for healthy functioning of body cells.



## Free radicals? Not so radical.

To get into the science, free radicals have one or more unpaired electron which makes them super unstable. These little guys hate being unstable so will do anything to stabilise themselves – and to do this, they 'steal' the much needed electrons from other molecules. But now the 'victim' molecule is unstable and turns into a free radical itself, leading to a continuous chain of destruction.

## Where do free radicals come from?

The origin of free radicals in our body can vary from routine body processes (normal and necessary), to our body's immune response to viruses and bacteria. They can also come from outside sources such as pollution, cigarette smoke, radiation, pesticides, chemical contaminants, and food components. The most well-recognized offenders are chemical contaminants such as PCBs, DDT, dioxin, furans (found in jarred and canned foods), and pesticides. Also rancid fats and fats damaged by high -temperature cooking, metals including cadmium, chromium, cobalt, copper, iron, mercury, nickel, and vanadium and lastly, alcohol.

## What is the damage free radicals can have on our bodies?

Your body is pretty good at dealing with free radicals, but if antioxidants are unavailable, or if free radical production becomes excessive, cell death can occur. Free radicals begin by attacking fats, proteins, carbohydrates and even DNA and RNA. What they really love attacking is unsaturated fats – unsaturated fats are the main component of cell membranes. This type of oxidative damage can accelerate aging, cause degeneration of the brain and eyes, and contribute to numerous chronic diseases such as cancer, diabetes and heart disease.

## Antioxidants to the rescue- fighting off those villainess free radicals

Remember when we talked about free radicals having unpaired electrons? What antioxidants contribute to this situation is the necessary electron to stabilise the free radical. How do antioxidants differ from other molecules? They continue to be protected from becoming a free radical themselves and remain stable despite donating their electron to the free radicals. Thus, they stop the destructive chain reaction and neutralise the situation.

## What are the strongest members of the antioxidant army?

Antioxidants found in your food work as part of a team. They work together with an array of different nutrients to help extend one another's lives and improve performance. But there are some that stand out longer than others; these are carotenoids (converted into vitamin A), vitamin C, vitamin E, and selenium.

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*[NOTE: Some sentiments contained within "What We're Reading" articles may not strictly conform with PROJECT: PFC's nutritional outlook. We read articles containing opposing information all the time and derive our nutritional philosophies from the latest science, the opinions of experts worldwide and our anecdotal experiences in the field. We keep an open mind and a strong affinity for fact-based evidence to help make the world of nutrition "Simple Again" for you.]*

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## Vitamin A

The carotenoids that can be converted into vitamin A are part of this antioxidant army and include alpha-carotene, beta-carotene, and beta-cryptoxanthin. Vitamin A from animal meat and milk has no antioxidant activity. Carotenoids act as antioxidants and may protect against many cancers and macular degeneration, and support communication between cells in the body. Carotenoids give fruits and vegetables their beautiful colours and are rich in apricots, chillies, guava, mangoes, papaya, persimmons, pink grapefruit, pumpkin, squash, sweet peppers (capsicum), sweet potatoes, tomatoes and watermelon. Also broccoli, collard greens green beans, kale and

spinach. Red peppers (capsicum) have significantly more carotenoids and antioxidant activity than other shades of peppers, and mature leaves of endive and lettuce contain more carotenoids than young, pale leaves on the same head.

#### Tips for maximizing Vitamin A

- The body absorbs some carotenoids such as lycopene more effectively from cooked foods compared to raw. Lycopene is linked with reduced risk of prostate cancer and is better absorbed from cooked foods such as tomato paste compared to raw tomatoes.
- Certain carotenoids are more readily absorbed from foods that have been juiced, blended, or pureed because the plant matrix is disrupted and cells are broken.
- As vitamin A is a fat soluble vitamin – include fat sources in small amounts when consuming carotenoid rich foods.

### **Vitamin C**

This water soluble vitamin requires daily consumption as it is not stored in the body. Best sources as we all know include citrus fruits, strawberries, kiwifruit and guava, but also broccoli and brussels sprouts. Vitamin C is easily destroyed by light, heat, and oxygen so minimal cooking and proper storage are important for ensuring your getting the maximum amount of this good guy out of your foods. Vitamin C not only protects against free radicals but also serves to regenerate other antioxidants such as vitamin E.

#### Tips for maximizing Vitamin C

- Choose raw, fresh, organic plant foods that are grown in sunlight.
- Organic crops tend to be higher in vitamin C compared to nonorganic.
- Vegetables show seasonal changes- broccoli grown in fall have double the amount of vitamin C than those grown in spring.
- Vitamin C is vulnerable to heat – less loss of vitamin C in broccoli occurs with steaming rather than boiling.
- Broccoli loses 38% of its vitamin C post 3 weeks of refrigeration and only 10% after 2 months of freezing.

### **Vitamin E**

Vitamin E is not just one antioxidant – but 8! But the most important in terms of our health is alpha-tocopherol which is the only form of the vitamin that contributes towards the RDA of 15mg/day. What makes this fat soluble vitamin so important is that it is a protector of our cell membranes. Remember that cell membranes are made mainly of unsaturated fats which makes them extremely susceptible to free radical attacks – vitamin E neutralizes these free radicals. Unfortunately this good guy loses its antioxidant status after free radical neutralization, but vitamin C to the rescue has the ability to restore its activity. A chain reaction occurs as vitamin E is able to protect vitamin A from destruction. Vitamin E is found in nuts, seeds, whole grains, avocados, leafy green vegetables and vegetable oils – most people only consume about half of the RDA for vitamin E. Sprouting wheat greatly increases its content of vitamin E (and vitamin C and beta-carotene- more on that later). \*supplement form of vitamin E is not always made from all natural sources and synthetic vitamin E has only about half the potency of the natural alpha-tocopherol found in food. Best to source your vitamin E naturally. Check out my recipes for easy ways to incorporate this antioxidant into your food.

### **Selenium**

This trace mineral is a key component of several antioxidant enzymes and also supports the activity of vitamin E in preventing the oxidation of lipids (such as cell membranes). Selenium acts to prevent oxidative damage to heart cells, red blood cells and other cells and also has a role in converting a thyroid hormone into its active form. Thyroid problems can be linked to low selenium intakes. Best sources include Brazil nuts, sunflower seeds, whole grains, legumes and mushrooms. Selenium comes from the soil and levels vary greatly from one part of the world to another. Levels in the soil are low in Europe and central Asia, but tend to be higher in North America.

### **Antioxidants – Good for us and for the environment**

Animal products are particularly high in free radicals (pro-oxidants) due to high concentrations of chemical contaminants such as DDT, PCBs, dioxins and furans that move up in the food chain. Animal products also contain very little antioxidants and no phytochemicals. Processed foods and deep fried foods can also promote oxidative damage. By limiting foods that are known to cause oxidative stress in your body we are effectively not only creating a harmonious state within ourselves but also limiting consumption of foods and products that are known environmental hazards. By growing foods that are rich in antioxidants by utilising methods that are beneficial (or at least not detrimental) to the environment we can limit our carbon footprint while simultaneously taking care of our longevity. Think legumes, organic, raw and local.

### **What about supplements and multivitamins?**

Very few people require supplements. Those that do include the elderly and frail aged who have a reduced ability to absorb some nutrients. Also ladies during pregnancy and they may be used as a safeguard to ensure the higher needs are provided for. Studies on Vitamin C supplement use in combating the common cold show minimal effectiveness. Calcium supplements are being less routinely recommended due to their increased risk of kidney problems and heart disease. Multivitamins used in the general healthy population are generally a waste of money. They are a poor substitution for nutritious foods and lack the complex and valuable components found in foods. Nutrients work together and we have little understanding of the many synergistic effects of nutrients and antioxidants. Isolating a single nutrient can sometimes be dangerous. Many studies have shown that nutrients separated from food sources can act differently from what might be expected. There is much we still don't understand, but what we do know is that fruit and vegetables play an important role in fighting off harmful free radicals and oxidative stress.

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