

Understand more about antioxidants vs. free radicals

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Thursday, 28 August 2008

Free radicals are produced everyday in our daily life from our metabolism and environmental exposure. Free radicals are very harmful to our healthy cells, the highly reactive radicals beginning a chain reaction, like dominoes. Once the attack is started, it can cascade, finally causing cell damage. Cell disruption from free radicals accelerating aging process and many age-related diseases.... Only that antioxidants can neutralize free radicals, breaking the destructive power chain reaction.

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What is free radical?

Oxidants, commonly known as free radicals.

Free radicals are atoms with unpaired number of electrons, and then their chemical structures are very unstable. To gain stability, free radicals react quickly with other molecules by attacking the nearest stable molecule and stealing its electron. When the attacked molecule loses its electron, it becomes a free radical itself, the highly reactive radicals beginning a chain reaction, like dominoes. Once the process is started, it can cascade, finally causing cell damage. Cell disruption from free radicals contribute to aging and many chronic disease.

Where free radicals come from?

{bot_wrgoogle}When oxygen is metabolised (called oxidation), it creates free radicals.

Free radicals are naturally produced. Oxidation happens everyday in our normal metabolic processes and our exposure to environment like tobacco, smoke and radiation. Breathing, eating, going out in the sun all contribute to the process of oxidation.

Oxidation can be accelerated by stress, cigarette smoking, sunlight, pollution things that people put into their bodies such as alcohol, unhealthy foods and other factors.

Free radicals are very unstable molecules that can freely react with and destroy healthy cells, leading to cell dysfunction. Free radicals are believed to play a role in aging process, cancer, heart, eye, neurological and other diseases because they can bind to and alter the structure of DNA (genetic material) thus leading to mutations and eventually to cancer.

The effects of free radicals

Some of the degenerative conditions caused by free radicals include:

- * speeding up of the aging process
- * various forms of cancers
- * Increased risk of heart disease, since free radicals encourage low density lipoprotein cholesterol (LDL – bad cholesterol) to adhere to artery walls.
- * Damage to nerve cells in the brain like Alzheimer’s or Parkinson’s disease,
- * decline of the immune system

- * Deterioration of the eye lens, cataracts which lead to blindness (Age-related macular degeneration - AMD)
- * Inflammation of the joints (arthritis)
- * Etc.

What is Antioxidant?

Antioxidants (or anti-oxidation agents) are substance that protect body cells from the damage caused by oxidation from free radicals (free oxygen radicals).

Antioxidants scavenge free radicals from our body cells by binding to free radicals, decreasing the free radicals destructive power. Antioxidants neutralize free radicals by donating one of their own electrons, breaking the electron-stealing chain reaction. The antioxidant themselves do not become free radicals by donating an electron because they are stable in either form.

Antioxidants act like scavengers, preventing cell damage. Antioxidants can also help repair damage already sustained by cells.

Benefits of antioxidants

Preventing oxidation process, we will live longer healthily and look younger. Antioxidants help reduce or eliminate the risk of certain illnesses, lower risk for infection, cancer and also improve our immune body system.

Simple explanation: the antioxidant process is similar to stopping an apple from browning. Once we cut an apple, it begins to brown, but if dip it in orange juice, (which contains vitamin C - one kind of antioxidants), the apple stays white.

Some examples of beneficial effects: antioxidants found in grapes, cocoa, blueberries, and teas on cardiovascular health, Alzheimer's disease, and even reduction of the risk of some cancers. vitamin C found in citrus fruits, spinach, broccoli etc. combating free-radical formation caused by pollution and cigarette smoke. Also helps return vitamin E to its active form.

Sources of antioxidants

Because oxidation happens naturally by our metabolism and environmental exposure, consumption of antioxidants must to maintain health. Our body has some defense mechanism to against free radicals oxidation. It can produce some antioxidants like glutathione, lipoic acid, and CoQ10 in a small amount. But these antioxidants level decline with age and studies found that these our own antioxidants become less and less effective with aging. Our body cannot manufacture antioxidants, we can gain antioxidants only in the diet.

Antioxidants are found in certain foods. These include fruits and vegetables, nuts, grains, and some meats, poultry and fish. The most common antioxidants are the vitamins A, C, E and beta-carotene. These nutrients are commonly found in fruits and vegetables, those with the strong colors being healthier such as pumpkin, mangoes, carrots, orange tomatoes and spinach. Additional antioxidants are found in grapes, wine, selenium, minerals copper and zinc. Flavonoids consist of a large family of antioxidant compounds found in fruits and vegetables such as catechins from green tea, genistein from soy, anthocyanins from cranberries etc.

Eating raw fruits and raw vegetables rather than cooked, gives us the highest concentration and best absorption of antioxidants. (Note: except for carrot and tomatoes, both cooked will give more benefits than raw) Dietary supplements are another solution for those do not consume enough antioxidant-producing foods.

A recent review of current literature suggests that fruits and vegetables in combination have synergistic effects on antioxidant activities leading to greater reduction in risk of chronic disease, specifically for cancer and heart disease.

The American Cancer Society suggests five daily serves of fruit and vegetables. One serve is a medium-sized piece of fruit or a half-cup of vegetables.

Vitamin E : d-alpha tocopherol. A fat soluble vitamin found in nuts, seeds, vegetable and fish oils, whole grains especially. wheat germ, fortified cereals, and apricots.

Vitamin C : ascorbic acid. A water soluble vitamin foundt in citrus fruits, green peppers, cabbage, spinach, broccoli, kale, cantaloupe, kiwi, and strawberries.

Beta-carotene : a precursor to vitamin A (retinol) found in egg yolk, milk, butter, spinach, carrots, squash, broccoli, tomato, cantaloupe, peaches, and grains. Beta-carotene is converted to vitamin A within the body.

Green Tea - the Best source of antioxidants

Tea can be divided in three main varieties: green, black, and oolong. Green, black, and oolong tea are all derived from the leaves of the tea plant (*Camellia sinensis*).

The tea plant, an evergreen shrub is heavily branched, with young hairy leaves. Tea plant yields both green and black tea. Green tea is from the plant parts of the leaf bud, and the two adjacent young leaves together with the stem, broken between the second and third leaf. Older leaves are considered inferior in quality and are produced for black tea.

The difference between the teas arises from processing. The production of Green tea is by lightly steaming the fresh cut leaf, no oxidation. Green tea is prepared from unfermented leaves, the leaves of oolong tea are partially fermented (oxidized), and black tea is fully fermented (the leaves to oxidized). The more the leaves are fermented, the lower the polyphenol content and the higher the caffeine content.

Green tea is made from unfermented leaves and that it contains the highest concentration of powerful antioxidants called polyphenols, natural antioxidant. Black tea leaves have a much lower content of polyphenols because black tea leaves undergo extensive fermentation during which many of the catechins are oxidized to darker coloured molecules (theaflavin and thearubigen).

What is EGCG?

EGCG stands for Epigallocatechin Gallate.

There are four primary polyphenols in green tea , the most important polyphenols, called catechins (sometimes referred to as tea flavonoids). The family of catechins are; Gallocatechin (GC), Epigallocatechin (EGC), Epicatechin (EC), and Epigallocatechin Gallate (EGCG). All catechins are beneficial. EGCG is the most abundant catechin in tea and is considered the main active ingredient in green tea.

Catechins were initially discovered in the 1970s, when medical researchers were looking for the reason: why Japanese in Shizuoka district, a major tea growing area, had much lower rates of cancer than other Japanese, even they were very heavy smokers. Numerous studies found EGCG to be effective in preventing and inhibiting cancer growth. EGCG converts carcinogens into benign substances.

Epigallocatechin gallate possess the most potent antioxidant activity of the catechins - yet discovered. EGCG is 100 more powerful than vitamin C and 25 times more effective than vitamin E.

Catechins are found in various foods such as wine, grapes and chocolate but in little amount catechins. The most abundant catechins are especially found in green tea. The leaf bud and first leaves of tea plant are richest in epigallocatechin gallate, that's green tea - the best source of EGCG.

Health Benefits of EGCG

EGCG, the most powerful antioxidant. EGCG is at least 100 times more effective than vitamin C and 25 times than vitamin E.

EGCG, being the powerful antioxidant - protecting cells from damage by ending free radicals chain reaction. Cell disruption contribute to aging process, many forms of cancer, heart disease and other potentially life-threatening illnesses.

Studies lists of benefits of EGCG in green tea

Rather than benefits as powerful antioxidant, there are many studies about EGCG in green tea as :

- * protects the skin from visible radiation-induced damage UV
- * help reduce atherosclerotic plaques, reduce a risk for heart disease. EGCG can block the oxidation of LDL (bad) cholesterol, increase HDL (good) cholesterol, improve the ratio of LDL (bad) to HDL (good) cholesterol.
- * increase in the activity of antioxidant and detoxifying enzymes (glutathione peroxidation, glutathione reductase and glutathione S transferase, catalase and quinone reductase) in the small intestine, liver and lungs significantly
- * increase antioxidants in blood alleviates diabetes by improving Insulin sensitivity in Type 2 Diabetes
- * reduce damage to blood vessels in smokers.
- * good oral health, including fresh breath
- * protects against kidney disease
- * prevents Osteoporosis (weak bone in menopause due to the decrease of estrogen hormone)

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