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## WHAT ARE ANTIOXIDANTS? WHAT IS THEIR ROLE IN HEALTH?

Before discussing their role in maintaining good health, let's first clarify what antioxidants are. "Antioxidant" is a classification of several organic substances, including vitamins C and E, vitamin A (which is converted from beta-carotene), selenium (a mineral), and a group known as the carotenoids. Carotenoids, of which beta-carotene is the most popular, are a pigment that adds color to many fruits and vegetables; without them, carrots wouldn't be orange, for example. Together as antioxidants, these substances are thought to be effective in helping to prevent cancer, heart disease, and stroke.

At the molecular and cellular levels, antioxidants serve to deactivate certain particles called free radicals. In humans, free radicals usually come in the form of O<sub>2</sub>, the oxygen molecule. The oxygen molecule wants to be oxidized (remember that stuff from your chemistry class?), and this oxidation process can sometimes be carcinogenic. Free radicals are the natural by-products of many processes within and among cells. They are also created by exposure to various environmental factors, tobacco smoke and radiation, for instance.

If allowed to go their merry way, these free radicals can cause damage to cell walls, certain cell structures, and genetic material within the cells. In the worst case scenario and over a long time period, such damage can become irreversible and lead to disease (e.g., cancer). This is where *antioxidants* come into play.

Antioxidants play the housekeeper's role, "mopping up" free radicals before they get a chance to do harm in your body. Researchers have postulated that antioxidants prevent the possible carcinogenic effects of oxidation. Despite numerous studies carried out on the role of antioxidants in cancer and heart disease prevention, the jury is still out as to which groups of people, if any, benefit from taking antioxidant supplements; evidence does suggest, however, that antioxidant supplements don't work as well as the naturally occurring antioxidants in a wide variety of fresh fruits, vegetables, whole grains, lean meats and dairy products.

Some studies have shown that smokers with diets high in carotenoids have a lower rate of lung cancer development than their smoking counterparts whose carotenoid intake is relatively low. However, a recent study indicated that some beta-carotene takers, primarily smokers, actually had higher death rates. Other research efforts have suggested that diets high in carotenoids may also be associated with a decreased risk of breast cancer. Also, vitamin C has been found to prevent the formation of N-nitroso compounds, the cancer-causing substances from nitrates and nitrites found in preserved meats and in some drinking water.

Many researchers claim that elderly people, especially those who have reduced their food intake, frequent aspirin users, heavy drinkers, smokers, and people with impaired immune systems may benefit from taking antioxidant supplements daily. In terms of heart disease and stroke, it is possible that higher levels of antioxidants slow or prevent the development of arterial blockages, a complicated process involving the oxidation of cholesterol. Moreover, antioxidants may deter the collection of plaque on arterial walls.

Obviously, conflicting reports on the health benefits of antioxidants and beta-carotene exist. It is best to remember that vitamin and mineral *supplements* should never be used as *substitutes* for a healthy, well balanced diet! It is also important to note that we can "over-supplement" our bodies, taking much more than the recommended daily

value of certain vitamins and minerals. Vitamins A and E are fat soluble, meaning that excess amounts are stored in the liver and fatty tissues, instead of being quickly excreted, creating a risk of toxicity. Your best bet is to eat a diet rich in fruits, veggies, and whole grains. Always consult with your physician before supplementation.

Good sources of antioxidants include:

- **Allium sulphur compounds** - leeks, onions, garlic
- **Anthocyanins** - eggplant, red grapes, berries, cherries
- **Beta-carotene** - pumpkin, mangoes, apricots, carrots, spinach and parsley
- **Catechins** - red wine and tea
- **Copper** - seafood, lean meat, milk and nuts
- **Cryptoxanthins** - red capsicum, pumpkin and mangoes
- **Flavonoids** - tea, green tea, citrus fruits, red wine, onion, apples, berries, cherries, red grapes, broccoli
- **Indoles** - cruciferous vegetables such as broccoli, cabbage and cauliflower
- **Isoflavonoids** - soybeans, tofu, lentils, peas and milk.
- **Lignans** - sesame seeds, bran, whole grains and vegetables
- **Lutein** - leafy greens like spinach, kale and collards; corn, eggs, citrus
- **Lycopene** - tomatoes, pink grapefruit and watermelon
- **Manganese** - seafood, lean meat, milk and nuts
- **Polyphenols** - thyme and oregano
- **Selenium** - seafood, offal, lean meat and whole grains
- **Vitamin C** - oranges, black currants, kiwi fruit, mangoes, broccoli, spinach, capsicum and strawberries
- **Vitamin E** - vegetable oils (such as wheat germ oil), avocados, nuts, seeds and whole grains
- **Zinc** - seafood, lean meat, milk and nuts
- **Zoochemicals** - red meat, offal and fish. Also derived from the plants animals eat.