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## Antioxidants

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### Summary

- The process of oxidation in the human body produces unstable chemicals called free radicals, which damage cell membranes and other structures.
  - Free radicals have been linked to a variety of diseases, including heart disease and certain cancers.
  - Antioxidants are compounds in foods that scavenge and neutralise free radicals.
  - Evidence suggests that antioxidant supplements do not work as well as the naturally occurring antioxidants in foods such as fruits and vegetables.
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The process of oxidation in the human body damages cell membranes and other structures, including cellular proteins, lipids and DNA. When oxygen is metabolised, it creates unstable molecules called 'free radicals', which steal electrons from other molecules, causing damage to DNA and other cells.

The body can cope with some free radicals and needs them to function effectively. However, the damage caused by an overload of free radicals over time may become irreversible and lead to certain diseases, including heart disease, liver disease and some cancers (such as oral, oesophageal, stomach and bowel cancers). Oxidation can be accelerated by stress, cigarette smoking, alcohol, sunlight, pollution and other factors.

### Antioxidants and free radicals

Antioxidants are found in certain foods and may prevent some of the damage caused by free radicals by neutralising them. These include the nutrient antioxidants, vitamins A, C and E, and the minerals copper, zinc and selenium.

Other dietary food compounds, such as the phytochemicals in plants, are believed to have greater antioxidant effects than vitamins or minerals. These are called the non-nutrient antioxidants and include phytochemicals, such as lycopenes in tomatoes and anthocyanins found in cranberries.

### The effect of free radicals

Some conditions caused by free radicals include:

- deterioration of the eye lens, which contributes to blindness
- inflammation of the joints (arthritis)
- damage to nerve cells in the brain, which contributes to conditions such as Parkinson's or Alzheimer's disease
- acceleration of the ageing process
- increased risk of coronary heart disease, since free radicals encourage low-density lipoprotein (LDL) cholesterol to stick to artery walls
- certain cancers, triggered by damaged cell DNA.

### Disease-fighting antioxidants

A diet high in antioxidants may reduce the risk of many diseases, including heart disease and certain cancers. Antioxidants scavenge free radicals from the body cells, and prevent or reduce the damage caused by oxidation.

The protective effect of antioxidants continues to be studied around the world. For instance, men who eat plenty of the antioxidant lycopene (found in tomatoes) may be less likely than other men to develop prostate cancer. Lutein, found in spinach and corn, has been linked to a lower incidence of eye lens degeneration and associated blindness in the elderly. Flavonoids, such as the tea catechins found in green tea, are believed to contribute to the low rates of heart disease in Japan.

## Sources of antioxidants

Plant foods are rich sources of antioxidants. They are most abundant in fruits and vegetables, as well as other foods including nuts, wholegrains and some meats, poultry and fish.

Good sources of specific antioxidants include:

- **allium sulphur compounds** – leeks, onions and garlic
- **anthocyanins** – eggplant, grapes and berries
- **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 and apples
- **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** – green, leafy vegetables like spinach, and corn
- **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 A** – liver, sweet potatoes, carrots, milk, and egg yolks
- **vitamin C** – oranges, blackcurrants, kiwifruit, mangoes, broccoli, spinach, capsicum and strawberries
- **vitamin E** – vegetable oils (such as wheatgerm 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 that animals eat.

## Vitamin supplements

There is increasing evidence that antioxidants are more effective when obtained from whole foods, rather than isolated from a food and presented in tablet form – and some supplements can actually increase cancer risk. For instance, vitamin A (beta-carotene) has been associated with a reduced risk of certain cancers, but an increase in others, such as lung cancer in smokers, if vitamin A is purified from foodstuffs.

A study examining the effects of vitamin E found that it did not offer the same benefits when taken as a supplement. Also, antioxidant minerals or vitamins can act as pro-oxidants or damaging 'oxidants' if they are consumed at levels significantly above the recommended amounts for dietary intake.

A well-balanced diet, which includes consuming antioxidants from whole foods, is best. If you insist on taking a supplement, seek supplements that contain all nutrients at the recommended levels.

## General recommendations for antioxidants

Research is divided over whether or not antioxidant supplements offer the same health benefits as antioxidants in foods. It is recommended that people eat a wide variety of fresh fruits, vegetables, whole grains, lean meats and dairy products every day.

Your diet should include five daily serves of fruit and vegetables. One serve is a medium-sized piece of fruit or a half-cup of cooked vegetables. It is also thought that antioxidants and other protective constituents from vegetables, legumes and fruit need to be consumed regularly from early life to be effective. See your doctor or dietitian for advice.

## Where to get help

- Your doctor

- **Dietitians Association of Australia** Tel. **1800 812 942**

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