



ANTIOXIDANTS

What are antioxidants?

Before we discuss antioxidants we need to give you some background information.

- mixed carotinoids such as alpha-carotene, beta-carotene, lycopene
- zinc

Free radicals

Many of the body's functions rely on a series of chemical reactions called oxidation. Molecules called free radicals are a natural by-product of oxidation. Production of free radicals can be useful: for instance, cells of the immune system can attack tumours, bacteria, fungi and virus-infected cells with a burst of free radicals. However, prolonged, high-level production of free radicals can cause problems for the body in much the same way that rust damages or ages a car. Antioxidants protect the body from some of the damaging effects of free radicals.

The body's antioxidants

To protect itself from excessive exposure to free radicals, the body can make its own antioxidants by using some of the following nutrients that are found in food or supplements:

- the amino acid cysteine
- minerals such as copper, manganese, selenium and zinc
- B complex vitamins

The body also depends on ready-made antioxidants — found in food — examples of which include:

- vitamin C
- vitamin E

HIV, the body and antioxidants

Researchers have found that HIV infection increases the production of free radicals inside the body. To counter this, the body attempts to increase its own production of antioxidants. This strategy may work for awhile but, unfortunately, a number of events hamper this defense, including the following:

- HIV damages the intestine, resulting in a decreased ability to break down and absorb nutrients found in food. This damage occurs very early in the course of HIV infection.
- The overall demand for key nutrients — high-quality protein, vitamins, minerals — increases as HIV infection takes hold, and the immune system needs to respond to continuous attack from the virus. This response includes replenishing vast numbers of the immune system's cells that have been disabled or destroyed; making chemical signals (interleukins and cytokines), hormones and antibodies that are all created (and sometimes destroyed) on a daily or even more frequent basis.
- At least two studies have documented that people with HIV/AIDS (PHAs) lose large amounts of cysteine — between 3 to 4 grams — in their urine every day. Researchers aren't sure why the body loses



so much of this vital nutrient. Despite the use of highly active antiretroviral therapy (HAART), the body continues to lose cysteine at a high rate.

- HIV-infected cells “steal” vital nutrients from the body that these cells need in order to make many viruses every day.

Thus the demand for vital nutrients is high. In such a situation, antioxidant production may not get first priority. Moreover, the nutrients may simply not be available because of the following factors:

- reduced absorption from the intestine
- poor eating habits
- loss of appetite (sometimes a side effect of medications)
- diarrhea

Cells of the immune system need antioxidants to work properly. Researchers have found that levels of antioxidants inside important immune cells, such as CD4 and CD8 cells, taken from PHAs are low. This deficit inside immune cells may impair their ability to fight HIV. Not surprisingly, at least two studies have found that supplements of NAC (N-acetyl-cysteine), a source of cysteine, has done the following in PHAs:

- increased their survival
- enhanced the functioning of their immune system

Why do PHAs use antioxidants?

Some PHAs in Canada who know about the effect of HIV on the body and who can afford to do so take supplements of NAC and other antioxidants to support their immune system. Another reason some PHAs take these supplements may be to protect their liver and kidneys from the toxicity of medication or reduce the damage from hepatitis B/C infection. That people would use NAC to protect their liver is not surprising as NAC is licensed as a treatment for people who overdose on Tylenol (acetaminophen). NAC works by protecting the liver from being destroyed by Tylenol.

Available forms and usage

Many of the antioxidant supplements are available in pill, powder or liquid form, primarily from health food stores. Here’s a list of antioxidants or the compounds used to make them that are taken by some PHAs:

- vitamins C and E
- alpha-lipoic acid
- mixed carotinoids
- selenium
- zinc
- NAC (N-acetyl-cysteine)
- Co-enzyme Q₁₀

While we have mentioned specific antioxidant supplements, readers should note that rich sources of antioxidants — vitamins C and mixed carotinoids — are fresh fruit and vegetables, particularly the following:

- dark, leafy vegetables such as spinach, kale, lettuce and bok choy
- dark-coloured berries such as blueberries, blackberries and raspberries
- carrots
- other red, orange and yellow vegetables

Although dark grapes and dark grape juice are also rich sources of antioxidants they also contain a relatively high amount of sugar. PHAs who may be at risk for developing diabetes because of their age, prolonged use of protease inhibitors or other risk factors may wish to decrease their intake of large amounts of sugar and sugary fruit such as grapes and grape juice. Teas made from alfalfa and nettle also contain antioxidants.

Cautions and concerns

Although some supplements may be considered harmless because they are nutrients or they are “natural” or come from “natural sources,” this is not necessarily the case. For instance, high doses of zinc over prolonged periods can weaken the immune system. Consult a health care professional who is knowledgeable about nutrition and HIV to help



you build a regimen of antioxidants that's right for you. As well, we suggest that you read the other CATIE Supplement Sheets on specific antioxidants — such as zinc and copper, alpha-lipoic acid, milk thistle and NAC — and other nutrients, available on our website.

Credits

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Disclaimer

Decisions about particular medical treatments should always be made in consultation with a qualified medical practitioner knowledgeable about HIV-related illness and the treatments in question.

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