The Marvellous Health Benefits of Selenium

By Hugh Wallace Naturopath

Selenium is finally coming out of the closet. It has not been widely known or discussed as a supplement, and often the only mention of it was as a caution against its likely toxicity (in the 1950's it was regarded as a non-essential toxic mineral) ¹.

Except in some circles, where its benefit in managing cancer had generated some interest – although which form to use and safe dosages were uncertain.

Selenium is a trace mineral, an element on the periodic table close to sulphur. It occurs naturally as sodium selenite. The organic supplemental form is selenomethionine which is very safe and well absorbed. Sodium selenite is available as the inorganic supplemental form, also safe and well absorbed¹.

The TGA has control over the sale of selenium; most registered supplements contain the organic form. It may be available at a pharmacy or healthfood shop; however most natural health practitioners should be able to supply it, usually as liquid to be used in drop doses, but recently available as a tablet.

The best food source is Brazil nuts; each nut kernel contains about 90 µg selenium! ²

The unit of measure for selenium is the microgram. 1 gram has 1000 milligrams (mg); 1 milligram has 1000 micrograms (µg or mcg).

Fortunately the authorities controlling supplements have recently set realistic dose ranges. Any multivitamin containing selenium used to carry a TGA warning that daily doses above 50 µg from all sources were not to be exceeded; this has recently been revised upward to 150 µg. However the National Health and Medical Research Council (NH&MRC) has been even more realistic, recently setting doses which are excellent guidelines for selenium use (see their website) ³.
The NH&MRC dose for an adult is from 250 to 400 µg daily, a young child up to 50 µg, primary school ages up to 150 µg, adolescents may use the adult doses. Take it once daily with water, anytime.

Numerous trials showing benefit of selenium in cancer management have used doses of 200 and 250 µg. Many people have used doses of 1000 µg long term with no effects apart from vibrant health; although there is evidence that daily dosage of 5000 µg and more over some years may lead to hair loss and irreversible thickening of finger and toe nails. Acute overdose with a significant amount may be very dangerous.

The most important role of selenium is probably as the body's best antioxidant as part of glutathione peroxidase (GPX). GPX prevents lipids and fats from being peroxidized (oxidized), which literally means that it prevents fats from going rancid (this can be seen on your skin as "age spots" or "liver spots" (autopsies show that skin "liver spots" are accompanied by similar spots of peroxidized fats in the liver.) Therefore selenium protects all of the cellular membranes, which are made up of fats, from peroxidation. Peroxidation of cellular membranes reduces the ability of the membrane to pass nutrients including minerals and vitamins, so selenium deficiency is the first step toward developing the many problems caused by nutrient deficiencies.

A selenium deficiency combined with high intake of vegetable oils (salad dressings, margarine, polyunsaturated cooking oils) may be the quickest route to a heart attack and cancer. The body uses a lot of selenium trying to protect the fats from peroxidation.

Selenium is crucial to thyroid function (also iodine). The thyroid is a master gland, controlling oxygen use and the basal metabolic rate, cellular metabolism and growth and development. The deiodinase enzymes which control thyroid hormone are selenium dependent. Low thyroid function (hypothyroidism) is becoming an epidemic, principally due to a chronic deficiency of iodine exacerbated by chlorine and fluorine intake.

It is worth noting that supplementing selenium in the presence of gross iodine deficiency may be problematic for the thyroid. Let us examine this problem.
Thyroid hormone production also produces hydrogen peroxide (H2O2), which can cause oxidative damage if a lack of selenium prevents GPX from being able to protect the cells (a main cause of Hashimoto's disease) 7. An iodine deficiency will cause goitre, an enlargement of the thyroid gland in an attempt to increase hormone production from a limited amount of iodine. So taking iodine will increase thyroid hormone production and the production of H2O2, but if selenium is deficient the thyroidal cells will suffer oxidative damage.

Supplementing selenium if iodine (thus thyroid hormone) is deficient allows constant conversion/degradation of existing thyroid hormone to its active form. An iodine deficiency causes depletion of the thyroid gland, leading to a worsening of the hypothyroidism 4.

Selenium has a powerful ability to support immune function, especially with regard to viral and bacterial infection. It has been shown repeatedly that serum selenium levels are linked directly to immune system function, including CD4 T lymphocyte count.

Apart from its proven benefit in preventing and treating cancer, the most astonishing benefit of selenium is its ability to interfere with the replication of the HIV virus, thus preventing the progression to AIDS 4.

Many viruses have a long life inside the body, including the herpes simplex virus, cytomegalovirus, varicella zoster virus, and Epstein-Barr virus. These viruses do not usually cause progressive diseases that worsen over time, but are held in check by a protective immune response. However, disease outbreaks can occur when the immune system is depressed, which may be seen in intermittent herpes simplex infections and in the shingles suffered by the elderly who had chickenpox as children.

The decline in serum selenium levels that accompanies viral or bacterial infection results in some degree of immune system depression. However
some pathogens, including certain retroviruses, effectively elude the immune system’s defence mechanisms and can continue to replicate indefinitely. Of particular significance are those viruses such as Coxsackievirus B3, Hepatitis C virus, and HIV-1 which encode glutathione peroxidase and, therefore, continue to deplete their hosts’ selenium.

This depletion of the selenium stores reduces the body's ability to produce the CD4 T lymphocytes which require this compound, allowing opportunistic infections to thrive, further depressing serum selenium levels which allows high replication rates for HIV. Also depleted are the amino acids glutamine (vital for the health of the lining of the gut), tryptophan (building block for serotonin in the brain) and cysteine (main component of glutathione, high amounts available in unpasteurised whey protein).

Once this process has begun it accelerates; because AIDS defining infections increase selenium depletion, and because HIV itself encodes selenium and glutathione. A positive feedback loop that allows Kaposi’s sarcoma, tuberculosis, typhoid, syphilis, pneumonia, and various other AIDS-related diseases to flourish.

Adequate body selenium levels are shown to prevent the slide from HIV infection to AIDS. In fact, this link is so strong it was used as the method to determine soil selenium levels across the African continent. Senegal has been blessed by an ancient geographical history which has left the land selenium rich. Prostitution flourishes in the capital city Dakar, which attracts visitors from the Arab world, yet this nation has extremely low rates of AIDS, despite a liberal attitude to sex. It also has low rates of cancer.

A link between elevated mortality from AIDS and depressed environmental selenium has been confirmed in the continental United States. Selenium concentrations in US soils had been established on the basis of this element’s level in local alfalfa; it has been shown that an inverse relationship exists between local selenium levels and the death rates from
AIDS ⁹. This relationship was particularly obvious amongst African Americans, apparently because they tended to be less mobile and more likely to eat locally grown foods.

If you combine your selenium supplement with adequate bodily levels of Vitamin D, you will have a simple and very powerful way to support your immune system. Vitamin D is actually a vital steroid hormone, generated by the skin in response to sunlight. Tanning is a healthy response to sunlight exposure; daily exposure of around half an hour in full sun for a large skin surface will generate adequate Vitamin D (you cannot get too much Vitamin D from the sun, but you don’t want to burn your skin). Remember that it takes around 24 hours for the newly formed Vitamin D to be absorbed, so don’t soap it out of your skin.

Be sure to include the selenium rich foods such as Brazil nuts, tuna, mackerel, brewers yeast and crab in your diet; if the soil is rich enough, beef, lamb, eggs, poultry and garlic will have useful amounts ¹⁰. And visit your natural health practitioner for a good selenium supplement!

Reference:

1. Elson M Haas; Staying Healthy with Nutrition 1992
2. USDA Nutrient Database
3. National Health & Medical Research Council; Nutrient Reference Values for Australia and New Zealand
4. Harold D Foster; What really causes AIDS 2002
5. Donald W Miller; Iodine for Health 2006
6. Guy E Abraham; The Safe and Effective Implementation of Orthoiodosupplementation In Medical Practice
7. Brownstein; Iodine, why you need it, why you can’t live without it
8. Sam Burcher; Selenium conquers AIDS 2004
9. The distribution of selenium and mortality owing to acquired immune deficiency syndrome in the continental United States; Biological trace element research 1997

10. Henry Osiecki; The nutrient bible 2002