

Evidence-based Selenium Usage

Name(s): Selenite, selenomethionine, selenized yeast, selenium dioxide

Warning: Iron should not be taken at the same time as antioxidants.

Description: Selenium functions much like vitamin E, protecting the cell membrane from free radicals. The oxidation of polyunsaturated fats is delayed when selenium is present. This prevents the elasticity of the skin from depleting, reducing the signs of ageing. The supply of oxygen to the heart is also regulated by this mineral. Selenium is essential for the production of prostoglandins as well. Prostoglandins are compounds that affect blood pressure. Sources of selenium include: meats, dairy products, fish, shellfish, brewer's yeast, broccoli, onions, and garlic.¹

Absorption/Storage: Approximately 90% of the selenium ingested is absorbed by the body. This mineral then travels to the non-fat tissues. The excess amounts are then excreted in the urine.¹

Recommended Dietary Allowance/Dietary Reference Intake:²

Person	Dose (mcg)
Birth to 3 years of age:	15 to 20
4 to 8 years of age:	20
9 to 13 years of age:	40
Adolescent and adult males:	55
Adolescent and adult females:	55
Pregnant females:	60
Breast-feeding females:	70

Optimum Daily Allowance (Adult): 100-200 mcg.³

Tolerable Upper Intake Levels:²

Persons	Dose (mcg)
Birth to 3 years of age	45-90
4 to 8 years of age	150
9 to 18 years of age	280-400
Adult males	400
Adult females	400
Pregnant females	400
Breast-feeding females	400

Principal Uses: Cancer prevention (particularly in men with cancer of the respiratory or gastrointestinal systems. Take with other antioxidants),⁴⁻²⁰ cardiovascular disease (especially in smokers),²¹⁻²⁶ and immune function (taken with copper and zinc).²⁷⁻³⁷

Proposed Uses: Asthma, atherosclerosis, colon cancer (reduces risk), depression, dermatitis herpetiformis, halitosis (if gum disease), heart attack, HIV support, immune function (for elderly people), infections (to prevent hospital-acquired infections in very low birth weight infants), infertility (male), pancreatic insufficiency, phenylketonuria (if deficient), prostate cancer (reduces risk) and rheumatoid arthritis³⁸

Traditional Uses: Cardiac arrhythmia, cardiomyopathy (only for Keshan's cardiomyopathy), colon cancer, diabetic retinopathy (in combination with vitamin A, vitamin C, and vitamin E), hepatitis, hypothyroidism (if deficient), liver cirrhosis, macular degeneration, Osgood-Schlatter disease, pap smear (abnormal), pre- and post-surgery health and retinopathy (combined with vitamin A, vitamin C and vitamin E).³⁸

Healthy Sources:

High (40%+ US DRI): Corn flour, oat bran, rye flour, dried or roasted sunflower seeds, wheat bran, wheat germ, wheat and whole wheat bread,³⁹ barley, Brazil nuts, brown rice, oats, red Swiss chard and turnips.⁴⁰

Medium (25-39% US DRI): Raw garlic, molasses, cooked or raw mushrooms, rice bran, roasted soybeans,³⁹ and orange juice.⁴⁰

Contraindications: If you are taking this dietary supplement without a prescription, carefully read and follow any precautions on the label. For selenium supplements, the following should be considered:

Allergies--Tell your health care professional if you have ever had any unusual or allergic reaction to selenious acid or selenium. Also tell your health care professional if you are allergic to any other substances, such as foods, preservatives, or dyes.

Pregnancy--It is especially important that you are receiving enough vitamins and minerals when you become pregnant and that you continue to receive the right amount of

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vitamins and minerals throughout your pregnancy. The healthy growth and development of the foetus depend on a steady supply of nutrients from the mother. However, taking large amounts of a dietary supplement in pregnancy may be harmful to the mother and/or foetus and should be avoided.

Studies in animals have shown that selenium causes birth defects when given in large doses.

Breast-feeding--It is important that you receive the right amounts of vitamins and minerals so that your baby will also get the vitamins and minerals needed to grow properly. However, taking large amounts of a dietary supplement while breast-feeding may be harmful to the mother and/or baby and should be avoided.

Children--Problems in children have not been reported with intake of normal daily-recommended amounts.

Older adults--Problems in older adults have not been reported with intake of normal daily-recommended amounts.

Medicines or dietary supplements--Although certain medicines should not be used together at all, in other cases or dietary supplements may be used together even if an interaction might occur. In these cases, your doctor may want to change the dose, or other precautions may be necessary. Tell your health care professional if you are taking any other dietary supplement or any non-prescription (over-the-counter [OTC]) or prescription medicine.

Other medical problems--The presence of other medical problems may affect the use of selenium supplements. Make sure you tell your health care professional if you have any other medical problems, especially:

- Kidney problems or
- Stomach problems--These conditions may cause higher blood levels of selenium, which may increase the chance of unwanted effects.⁴¹

Interactions:

Decreases Mineral Availability:	Clozapine, ³⁸ corticosteroids, ^{38,42} and gold. ⁴²
Increases Mineral Availability:	Vitamins B6, C & E. ⁴²

Is Decreased By Mineral Availability:	Cisplatin side effects. ³⁸
Is Increased By Mineral Availability:	Valproic acid effectiveness. ³⁸

Deficiency: While most people probably don't take in enough selenium, gross deficiencies are rare in Western countries. Soils in some areas are selenium deficient, and people who eat foods grown primarily on selenium-poor soils are at risk for deficiency. People with AIDS have been reported to be depleted in selenium. Similarly, limited research has reported an association between heart disease and depleted levels of selenium.³⁸

Toxicity/Side Effects: Along with its needed effects, a dietary supplement may cause some unwanted effects. Although selenium supplements have not been reported to cause any side effects, check with your health care professional immediately if any of the following side effects occur as a result of an overdose:

Symptoms of overdose

- Diarrhoea; fingernail weakening; garlic odour of breath and sweat; hair loss; irritability; itching of skin; metallic taste; nausea and vomiting; unusual tiredness and weakness.

Other side effects not listed above may also occur in some individuals. If you notice any other effects, check with your health care professional.⁴¹

Treatment for Overdose: Emesis is contra-indicated; basic poison management with lavage/activated charcoal with a laxative.⁴³

Storage: To store this dietary supplement:

- Keep out of the reach of children.
- Store away from heat and direct light.
- Do not store in the bathroom, near the kitchen sink, or in other damp places. Heat or moisture may cause the dietary supplement to break down.
- Keep the dietary supplement from freezing. Do not refrigerate.
- Do not keep outdated dietary supplement or those no longer needed. Be sure that any discarded dietary

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supplement is out of the reach of children.³⁷

References:

1. Dr. Morrow's Library of Vitamins, Minerals, Amino Acids, and Herbs: Magnesium. [Online] <http://www.nutritiondynamics.com/cgi-bin/process.asp?product=Selenium>
2. National Academy of Sciences Food and Nutrition Board. (2000). Dietary reference intakes: Applications in dietary assessment. Washington, DC: National Academy Press.
3. Balch, P.A. & Balch, J.F. (2000). Prescription for nutritional healing (third edition). Garden City Park: Avery Publishing.
4. National Research Council, Diet & Health. (1989). Implications for reducing chronic disease risk. Washington, DC: National Academy Press.
5. Hocman, G. (1988). Chemoprevention of cancer: Selenium. *International Journal of Biochemistry*, 20: 123-132.
6. Wasowicz, W. (1994). Selenium concentration and glutathione peroxidase activity in blood of children with cancer. *Journal of Trace Elements, Electrolytes in Health and Disease*, 8: 53-57.
7. Fex, G., Petterson, B. & Akesson, B. (1987). Low plasma selenium as a risk factor for cancer death in middle-aged men. *Nutrition and Cancer*, 10: 221-229.
8. Kok, F.J. et al. (1987). Is serum selenium a risk factor for cancer in men only?, *American Journal of Epidemiology*, 125: 12-16.
9. Clark, L.C., Combs, G.F., Turnbull, B.W. et al. (1996). Effects of selenium supplementation for cancer prevention in patients with carcinoma of the skin. *JAMA*, 276: 1957-1963.
10. Clark, L.C., Dalkin, B., Krongrad, A., Combs, G.F. Jr., Turnbull, B.W., Slate, E.H., Witherington, R., Herlong, J.H., Janosko, E., Carpenter, D., Borosso, C., Falk, S. & Rounder, J. (1998). Decreased incidence of prostate cancer with selenium supplementation: results of a double-blind cancer prevention trial. *British Journal of Urology*, 81(5): 730-734.
11. Combs, G.F. Jr., Clark, L.C. & Turnbull, B.W. (1997). Reduction of cancer mortality and incidence by selenium supplementation. *Med Klin.*, 92 Suppl 3: 42-45.
12. Combs, G.F. Jr., Clark, L.C. & Turnbull, B.W. Reduction of cancer risk with an oral supplement of selenium. *Biomedical and Environmental Science*, 10(2-3): 227-234.
13. Taylor, P.R., Li, B., Dawsey, S.M., Li, J.Y., Yang, C.S., Guo, W. & Blot, W.J. Prevention of oesophageal cancer: the nutrition intervention trials in Linxian, China. *Linxian Nutrition Intervention Trials Study Group. Cancer Research*, 54(7 Suppl): 2029s-2031s.
14. Li, J.Y., Li, B., Blot, W.J. & Taylor, P.R. (1993). [Preliminary report on the results of nutrition prevention trials of cancer and other common diseases among residents in Linxian, China]. *Chung Hua Chung Liu Tsa Chih*, 15(3): 165-181. Chinese
15. Li, W.G. (1992). [Preliminary observations on effect of selenium yeast on high-risk populations with primary liver cancer]. *Chung Hua Yu Fang I Hsueh Tsa Chih.*, 26(5): 268-271. Chinese
16. Yu, S.Y., Zhu, Y.J., Li, W.G., Huang, Q.S., Huang, C.Z., Zhang, Q.N. & Hou, C. (1991). A preliminary report on the intervention trials of primary liver cancer in high-risk populations with nutritional supplementation of selenium in China. *Biological Trace Element Research*, 29(3): 289-294.
17. Yu, S.Y., Mao, B.L., Xiao, P., Yu, W.P., Wang, Y.L., Huang, C.Z., Chen, W.Q. & Xuan, X.Z. (1990). Intervention trial with selenium for the prevention of lung cancer among tin miners in Yunnan, China. A pilot study. *Biological Trace Element Research*, 24(2): 105-108.
18. Willett, W.C., Polk, B.F., Morris, J.S., Stampfer, M.J., Pressel, S., Rosner, B., Taylor, J.O., Schneider, K. & Hames, C.G. (1983). Prediagnostic serum selenium and risk of cancer. *Lancet*, 2(8342): 130-134.
19. Almendingen, K., Trygg, K., Hofstad, B. Veierod, M.B. & Vatn, M.H. (2001). Results from two repeated 5-day dietary records with a 1 y interval among patients with colorectal polyps. *European Journal of Clinical Nutrition*, 55(5): 374-379.
20. Mark, S.D., Qiao, Y.L., Dawsey, S.M., Wu, Y.P., Katki, H., Gunter, E.W., Fraumeni, J.F. Jr, Blot, W.J., Dong, Z.W. & Taylor, P.R. (2000). Prospective study of serum selenium levels and incident oesophageal and gastric cancers. *Journal of the National Cancer Institute*, 92(21): 1753-1763.
21. Kok, F.J. et al. (1989). Decreased selenium levels in acute myocardial infarction. *JAMA*, 261: 1161-1164.
22. Salonen, J.T. (1982). Association between cardiovascular death and myocardial infarction and serum selenium in a matched-pair longitudinal study. *Lancet*, 2: 175-179.

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23. Beaglehole, R. et al. (1990). Decreased blood selenium and risk of myocardial infarction. *International Journal of Epidemiology*, 19: 918-922.
24. Luoma, P.V. et al. (1984). Serum selenium, glutathione peroxidase activity and high-density lipoprotein cholesterol-Effect of selenium supplementation. *Research Communications in Chemical Pathology and Pharmacology*, 46: 469-472.
25. Stead, N.W. et al. (1984). Selenium (Se) balance in the dependent elderly. *American Journal of Clinical Nutrition*, 39: 677.
26. Korpela, H. et al. (1989). Effect of selenium supplementation after acute myocardial infarction. *Research Communications in Chemical Pathology and Pharmacology*, 65: 249-252.
27. Yu, S-Y., Li, W-G., Zhu, Y-J. et al. (1989). Chemoprevention trial of human hepatitis with selenium supplementation in China. *Biological Trace Element Research*, 20: 15-20.
28. Peretz, A., Néve, J., Desmedt, J. et al. (1991). Lymphocyte response is enhanced by supplementation of elderly subjects with selenium-enriched yeast. *American Journal of Clinical Nutrition*, 53: 1323-1328.
29. Kiremidjian-Schumacher, L. & Stotsky, G. (1987). Selenium and immune responses. *Environmental Research*, 42: 277-303.
30. Kiremidjian-Schumacher, L. (1994). Supplementation with selenium and human immune cell functions; II, Effect on cytotoxic lymphocytes and natural killer cells. *Biological Trace Element Research*, 41: 115-127.
31. Roy, M. (1994). Supplementation with selenium and human immune cell functions; I, Effect on lymphocyte proliferation and interleukin 2 receptor expression. *Biological Trace Element Research*, 41: 103-114.
32. Girodon, F., Galan, P., Monget, A.L., Boutron-Ruault, M.C., Brunet-Lecomte, P., Preziosi, P., Arnaud, J., Manuguerra, J.C. & Herchberg, S. (1999). Impact of trace elements and vitamin supplementation on immunity and infections in institutionalised elderly patients: a randomised controlled trial. *MIN. VIT. AOX. geriatric network. Archives of Internal Medicine*, 159(7): 748-754.
33. Liu, X., Yin, S. & Li, G. (1997). [Effects of selenium supplement on acute lower respiratory tract infection caused by respiratory syncytial virus]. *Chung Hua Yu Fang I Hsueh Tsa Chih.*, 31(6): 358-361. Chinese
34. Berger, M.M., Spertini, F., Shenkin, A., Wardle, C., Wiesner, L., Schindler, C. & Chioloro, R.L. (1998). Trace element supplementation modulates pulmonary infection rates after major burns: a double-blind, placebo-controlled trial. *American Journal of Clinical Nutrition*, 68(2): 365-371
35. Mei, W., Dong, Z.M., Liao, B.L. & Xu, H.B. (1991). Study of immune function of cancer patients influenced by supplemental zinc or selenium-zinc combination. *Biological Trace Element Research*, 28(1): 11-19.
36. Pike, J. & Chandra, R.K. (1995). Effect of vitamin and trace element supplementation on immune indices in healthy elderly. *International Journal of Vitamin and Nutrition Research*, 65: 117-121.
37. Chandra, R.K. (1992). Effect of vitamin and trace-element supplementation on immune responses and infection in elderly subjects. *Lancet*, 340: 1124-1127.
38. Austin, S., Gaby, A., Appleton, J. et al. (2001). *HealthNotes Online*. [Online] <http://healthnotes.com>
39. Pennington, J.A. (1998). *Boes and Church's food values of portions commonly used* (seventeenth edition). Philadelphia, PA: Lippincott.
40. Murray, M.T. (1996). *Encyclopaedia of nutritional supplements*. Rocklin, CA: Prima.
41. National Library of Medicine. (1995). *Selenium Supplements (systemic)*. [Online] <http://www.nlm.nih.gov/medlineplus/druginfo/seleniumsupplementssystemic202633.html>
42. Meletis, C. & Jacobs, T. (1999). *Interactions between drugs & natural medicines*. Sandy, OR.: Eclectic Medical Publications.
43. Leikin, J.B. & Paloucek, F.P. (1995). *Poisoning & toxicology handbook* (second edition). Hudson, Ohio: Lexi-Comp/American Pharmaceutical Assoc.

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Compiled by:
Michael John Nisbett, HBScN, RN
MSc (Nutrition) Candidate
