Name(s): Zinc sulphate, zinc gluconate, zinc citrate, zinc picolinate, chelated zinc

Description: Zinc is present in all tissues and is known for fighting disease and maintaining immunity. This mineral is involved in the integrity of taste acuity, a component of insulin, and is involved with over 2000 enzymes, in particular, the enzyme that is able to break down alcohol. Sources of zinc include: brewer's yeast, wheat bran, herring, and diets that are high in protein.¹

Absorption/Storage: The upper small intestine is the site of absorption. Only the amount needed by the body is absorbed at one time. The larger the quantity of calcium ingested, the less zinc absorbed. With an excess of fibre, the fibre binds the zinc; therefore, the zinc is unable to be absorbed. Zinc is stored in a wide variety of locations throughout the body. These locations include: eyes, prostate gland, bones, kidneys, pancreas, voluntary muscles, skin, fingernails, hair, and liver. Zinc is mainly excreted in the faeces with little lost in the urine.¹

When zinc combines with certain foods it may not be absorbed into your body and it will do you no good. If you are taking zinc, the following foods should be avoided or taken 2 hours after you take zinc:

- Bran
- Containing-containing foods
- Phosphorus-containing foods such as milk or poultry
- Whole-grain breads and cereals

Do not take zinc supplements and copper, iron, or phosphorus supplements at the same time. It is best to space doses of these products 2 hours apart, to get the full benefit from each dietary supplement.²

Recommended	Dietary	Allowance/Dietary	Reference
Intake: ³			_

Persons	U.S.
	(mg)
Birth to 3 years of age	2-3
4 to 9 years of age	5
9 to 13 years of age	8
Adolescent and adult males	11
Adolescent and adult females	8-9
Pregnant females	11-13
Breast-feeding females	12-14

Optimum Daily Allowance (Adult): 30-50 mg.⁴

Tolerable Upper Intake Level: None available.

Principal Uses: Acne,⁵⁻¹⁵ acrodermatitis enteropathica,^{16,17} colds (zinc gluconate or acetate),¹⁸⁻²⁸ Wilson's disease,²⁹⁻³⁸ and wound healing (zinc oxide if topical).³⁹⁻⁴⁶

Proposed Uses: Anorexia nervosa, birth defects prevention, canker sores (for deficiency only), celiac disease (for deficiency), cold sores (topical), common cold (as nasal spray), Crohn's disease, diabetes (preferably for those with a documented deficiency), genital herpes, gingivitis (zinc plus bloodroot toothpaste), halitosis (zinc chloride rinse or toothpaste), HIV support, immune function (for elderly people), infection, liver cirrhosis (for deficiency), macular degeneration, peptic ulcer, pregnancy support, sickle cell anaemia, skin ulcers (oral and topical zinc), sprains and strains (if deficient), and tinnitus (for deficiency only).⁴⁷

Traditional Uses: Amenorrhoea, athletic performance, benign prostatic hyperplasia (BPH), contact dermatitis, cystic fibrosis, dermatitis herpetiformis (for deficiency), diarrhoea, Down's syndrome, ear infections (recurrent), gastritis, pregnancy-induced (gestational) hypertension, hypoglycaemia, hypothyroidism, immune function (for nonelderly people), insulin resistance syndrome (Syndrome X), Osgood-Schlatter Disease, osteoarthritis (in combination with boswellia, ashwagandha, and turmeric), osteoporosis, pre- and post-surgery health, preeclampsia, prostatitis (CBP, NBP) and rheumatoid arthritis.⁴⁷

Healthy Sources:

High (40%+ US DRI): Amaranth, dark rye flour, raw defatted soy meal,⁴⁸ and pumpkin seeds.⁴⁹

Medium (25-39% US DRI): Adzuki beans, dried agar, brown rice flour, oat bran cereal, dry roasted soybean nuts,⁴⁸ brazil nuts, pecans and dry split peas.⁴⁹

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

Allergies--Tell your health care professional if you are allergic to any 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 vitamins and minerals throughout your pregnancy. The healthy growth and development of the foetus depend on a steady supply of nutrients from the mother. There is evidence that low blood levels of zinc may lead to problems in pregnancy or defects in the baby. However, taking large amounts of a dietary supplement in pregnancy may be harmful to the mother and/or foetus and should be avoided.

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. There is some evidence that the elderly may be at risk of becoming deficient in zinc due to poor food selection, decreased absorption of zinc by the body, or medicines that decrease absorption of zinc or increase loss of zinc from the body.

Medicines or other dietary supplements--Although certain medicines or dietary supplements should not be used together at all, in other cases they may be used together even if an interaction might occur. In these cases, your health care professional may want to change the dose, or other precautions may be necessary. When you are taking zinc supplements, it is especially important that your health care professional know if you are taking any of the following:

- Copper supplements or
- Tetracycline (medicine for infection)--Use with zinc supplements may cause these copper supplements or tetracycline to be less effective; zinc supplements should be given at least 2 hours after copper supplements, or tetracycline

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

• Copper deficiency--Zinc supplements may make this condition worse.²

Interactions:

Decreases Mineral Availability:	Aspirin, ACE inhibitors, bile acid sequestrants, calcium acetate, oral contraceptives oral corticosteroids, risedronate, thiazides, warfarin, ⁴⁷ folic acid (high dose), penicillamine, ^{47,50} tetracyclines, ^{47,50,51} alcohol, black tea, coffee, EDTA, ethambutol, iron, phytates, ranitidine, ulcer drugs, zidovudine, ⁵⁰ and caffeine. ⁵¹	
Increases Mineral Availability:	Calcium, copper, phosphorus, vitamin B6, ³ conjugated oestrogens, medroxyprogesterone and sodium fluoride, ⁴⁷ magnesium, manganese, riboflavin, vitamin D and vitamin E. ⁵⁰	
Is Decreased By Mineral Availability:	Ciprofloxacin, tetracyclines, side effects of irradiation treatment for cancer, ⁴⁷ calcium (high doses), fluoroquinolones, ^{47,50} copper, iron, magnesium (high doses), vitamin A, ⁵⁰ and norfloxacin. ⁵¹	
Is Increased By Mineral Availability:	AZT effectiveness, benzamycin, chlorhexidine (oral zinc solution), clindamycin (topical zinc), topical corticosteroids, vaginal metronidazole. ⁴⁷	
Adverse Reactions:	Methyltestosterone. ⁴⁷	

Deficiency: Lack of zinc may lead to poor night vision and wound-healing, a decrease in sense of taste and smell, a reduced ability to fight infections, and poor development of reproductive organs.

Some conditions may increase your need for zinc. These include:

- Acrodermatitis enteropathica (a lack of absorption of zinc from the intestine)
- Alcoholism
- Burns
- Diabetes mellitus (sugar diabetes)
- Down's syndrome
- Eating disorders
- Intestine diseases

- Infections (continuing or chronic)
- Kidney disease
- Liver disease
- Pancreas disease
- Sickle cell disease
- Skin disorders
- Stomach removal
- Stress (continuing)
- Thalassemia
- Trauma (prolonged)

In addition, premature infants may need additional zinc.

Increased need for zinc should be determined by your health care professional.²

Toxicity/Side Effects: Zinc supplements are most effective if they are taken at least 1 hour before or 2 hours after meals. However, if zinc supplements cause stomach upset, they may be taken with a meal.

Along with its needed effects, a dietary supplement may cause some unwanted effects. Although not all of these side effects may occur, if they do occur they may need medical attention.

Check with your health care professional as soon as possible if any of the following side effects occur:

Rare--With large doses

• Chills; continuing ulcers or sores in mouth or throat; fever; heartburn; indigestion; nausea; sore throat; unusual tiredness or weakness

Symptoms of overdose

• Chest pain; dizziness; fainting; shortness of breath; vomiting; yellow eyes or skin

Other side effects not listed above may also occur in some individuals. If you notice any other effects, check with your health care professional.²

Treatment For Overdose: Lavage may be useful, dilute with milk, whole bowel irrigation has been utilised. Monitor copper levels and replace as needed.⁵¹

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 supplements or those no longer needed. Be sure that any discarded dietary supplement is out of the reach of children.²

References:

- Dr. Morrow's Library of Vitamins, Minerals, Amino Acids, and Herbs: Magnesium. [Online] http://www.nutritiondynamics.com/cgibin/process.asp?product=Zinc
- National Library of Medicine. (1995). Zinc Supplements (systemic). [Online] http://www.nlm.nih.gov/medlineplus/druginfo/zincsupp lementssystemic202622.html
- National Academy of Sciences. (2001). Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc. Washington, DC: National Academy Press.
- Balch, P.A. & Balch, J.F. (2000). Prescription for nutritional healing (third edition). Garden City Park: Avery Publishing.
- 5. Pohit, J. et al. (1985). Zinc status of acne vulgaris patients. Journal of Applied Nutrition, 37: 18–25.
- 6. Amer, M. et al. (1982). Serum zinc in acne vulgaris. International Journal of Dermatology, 21: 481.
- Michaelsson, G. et al. (1977). Serum zinc and retinolbinding protein in acne. British Journal of Dermatology, 96: 283–286.
- Goransson, K. et al. (1978). Oral zinc in acne vulgaris: A clinical and methodological study. Acta Dermavenereol (Stockholm) 58(5): 443–448.
- Dreno, B. et al. (1989). Low doses of zinc gluconate for inflammatory acne. Acta Dermavenereol (Stockholm), 69: 541–543.
- 10. Verma, K.C. et al. (1980). Oral zinc sulphate therapy in acne vulgaris: A double blind trial. Acta Dermatovener (Stockholm), 60: 337-340.
- Weimar, V.M. et al. (1978). Zinc sulphate in acne vulgaris. Archives of Dermatology, 114(12): 1776– 1778.
- 12. Hillstrom, L., Pettersson, L., Hellbe, L. et al. (1977).

Comparison of oral treatment with zinc sulphate and placebo in acne vulgaris. British Journal of Dermatology, 97(6): 679–684.

- Michaelsson, G., Johlin, L., & Ljunghall, K. (1977). Effects of oral zinc and vitamin A in acne. Archives of Dermatology, 113: 31.
- 14. Michaelsson, G. (1980). Oral zinc in acne. Acta Dermatovener (Stockholm), Suppl 89:87–93 [review].
- Michaelsson, G., Juhlin, L. & Ljunghall, K. (1977). A double blind study of the effect of zinc and oxytetracycline in acne vulgaris. British Journal of Dermatology, 97: 561–6.
- 16. Berkow, R. (1987). Merck Manual. Whitehouse Station, NJ: Merck Research Laboratories, 946.
- van Wouwe JP, Swart GM. (1991). [Acrodermatitis enteropathica; a literature review] Ned Tijdschr Geneeskd, 135(1): 21-23. Review. Dutch.
- Marshall, S. (1998). Zinc gluconate and the common cold. Review of randomised controlled trials. Canadian Family Physician, 44: 1037–1042.
- Eby, G.A. (1995). Linearity in dose-response from zinc lozenges in treatment of common colds. Journal of Pharmacy Technology, 11: 110–122.
- Mossad, S.B. et al. (1996). Zinc gluconate lozenges for treating the common cold: A randomised, double-blind placebo-controlled study. Annals of Internal Medicine, 125: 142–144.
- Petrus, E.J., Lawson, K.A. & Bucci, L.R. (1998). Randomised, double-masked, placebo-controlled clinical study of the effectiveness of zinc acetate lozenges on common cold symptoms in allergy-tested subjects. Current Therapy & Research, 59: 595–607.
- Girodon, F., Lombard, M., Galan, P. et al. (1997). Effect of micronutrient supplementation on infection in institutionalised elderly subjects: A controlled trial. Annals of Nutrition and Metabolism, 41(2): 98–107.
- 23. Sugarman, B. (1983). Zinc and infection. Review of Infectious Disease, 5(1): 137–147.
- Sazawal, S., Black, R.E., Jalla, S. et al. (1998). Zinc supplementation reduces the incidence of acute lower respiratory infections in infants and preschool children: A double-blind, controlled trial. Paediatrics, 102: 1–5.
- Bhutta, Z.A., Black, R.E., Brown, K.H. et al. (1999). Prevention of diarrhoea and pneumonia by zinc supplementation in children in developing countries: Pooled analysis of randomised controlled trials. Journal of Paediatrics, 135: 689–697.
- 26. Anonymous. (1997). Zinc lozenges reduce the duration

of common cold symptoms. Nutrition Review, 55: 82–88 [review].

- Garland, M.L. & Hagmeyer, K.O. (1998). The role of zinc lozenges in treatment of the common cold. Annals of Pharmacotherapy, 32: 63–69 [review].
- Prasad, A.S., Fitzgerald, J.T., Bao, B., Beck, F.W. & Chandrasekar, P.H. (2000). Duration of symptoms and plasma cytokine levels in patients with the common cold treated with zinc acetate. A randomised, doubleblind, placebo-controlled trial. Annals of Internal Medicine, 133(4): 245-252.
- 29. Hoogenraad, T.U., Van den Hammer, C.J.A. & Van Hattum, J. (1984). Effective treatment of Wilson's disease with oral zinc sulphate: Two case reports. British Medical Journal, 289: 273–276.
- Cossack, Z.T. (1988). The efficacy of oral zinc therapy as an alternative to penicillamine for Wilson's disease. New England Journal of Medicine, 318: 322–323 [letter/review].
- Brewer, G.J. & Yuzbasiyan-Gurkan, V. (1989). The use of zinc-copper metabolic interactions in the treatment of Wilson's disease. Journal of the American College of Nutrition, 8: 452 [abstr# 103].
- Brewer, G.J., Hill, G.M., Dick, R.D. et al. (1987). Treatment of Wilson's disease with zinc. III. Prevention of reaccumulation of hepatic copper. Journal of Laboratory and Clinical Medicine, 109: 526– 531.
- Brewer, G.J. & Yuzbasiyan-Gurkan, V. (1990). Use of zinc-copper metabolic interactions in the treatment of Wilson's disease. Journal of the American College of Nutrition, 9: 487–491.
- Brewer, J.G., Yuzbasiyan-Gurkan, V., Lee, D-Y. & Appelman, H. (1989). Treatment of Wilson's disease with zinc. VI. Initial treatment studies. Journal of Laboratory and Clinical Medicine, 114: 633–638.
- Van den Hamer, C.J.A. & Hoogenraad, T.U. (1989). Copper deficiency in Wilson's disease. Lancet, ii: 442 [letter].
- Brewer, G.J., Dick, R.D., Johnson, V.D. et al. (1998). Treatment of Wilson's disease with zinc: XV long-term follow-up studies. Journal of Laboratory and Clinical Medicine, 132: 264–278.
- Hoogenraad, T.U. (1998). Zinc treatment of Wilson's Disease. Journal of Laboratory and Clinical Medicine, 132: 240–1 [editorial].
- Brewer G.J., Dick, R.D., Johnson, V.D., Fink, J.K., Kluin, K.J. & Daniels, S. (2001). Treatment of Wilson's

disease with zinc XVI: treatment during the pediatric years. Journal of Laboratory and Clinical Medicine, 137(3): 191-198.

- Weismann, K. (1978). What is the use of zinc for wound healing? International Journal of Dermatology, 17: 568–570.
- 40. Pories, W.J., Henzel, J.H., Rob, C.G. & Strain, W.H. (1967). Acceleration of healing with zinc sulphate. Annals of Surgery, 165: 432–436.
- 41. Carruthers, R. (1969). Oral zinc sulphate in leg ulcers. Lancet, 1: 1264.
- 42. Cohen, C. (1968). Zinc sulphate and bedsores. British Medical Journal, 2: 561.
- Faure, H., Peyrin. J-C., Richard, M-J. & Favier, A. (1991). Parenteral supplementation with zinc in surgical patients corrects postoperative serum-zinc drop. Biological Trace Element Research, 30: 37–45.
- 44. Agren, M.S. (1990). Studies on zinc in wound healing. Acta Derm Venereol Supll (Stockh), 154: 1–36.
- 45. Stromberg, H.E. & Agren, M.S. (1984). Topical zinc oxide treatment improves arterial and venous leg ulcers. British Journal of Dermatology, 111(4): 461–468.
- 46. Ågren, M.S. (1999). Zinc in wound repair. Archives of Dermatology, 135: 1273–1274 [letter].
- 47. Austin, S., Gaby, A., Appleton, J. et al. (2001). HealthNotes Online. [Online] http://healthnotes.com
- 48. Pennington, J.A. (1998). Boes and Church's food values of portions commonly used (seventeenth

edition). Philadelphia, PA: Lippincott.

- 49. Murray, M.T. (1996). Encyclopaedia of nutritional supplements. Rocklin, CA: Prima.
- Meletis, C. & Jacobs, T. (1999). Interactions between drugs & natural medicines. Sandy, OR.: Eclectic Medical Publications.
- Leikin, J.B. & Paloucek, F.P. (1995). Poisoning & toxicology handbook (second edition). Hudson, Ohio: Lexi-Comp/American Pharmaceutical Assoc.

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