

Zinc

Facts:

- ◆ Zinc (Zinc) is an essential trace mineral occurring between 1.5-2 grams—making it almost as abundant as iron.
- ◆ Zinc has only been recognized as essential since 1974 by the National Academies' of Science.
- ◆ The typical intake of Zinc in Western diets hovers around 10 mg, one-third less than the recommended dietary intake.¹
- ◆ Approximately 90 percent of total body zinc is found in skeletal muscle and bone. Over 95 percent of total body zinc is bound to proteins within cells and cell membranes.²

Functions:

- ◆ Zinc has a variety of functions in the body. It is a component of at least 25 enzymes involved in digestion and metabolism, including carbohydrate digestion, and phosphorous metabolism^{1,2}.
- ◆ Zinc is essential for general growth and proper development of the reproductive organs and prostate gland function.^{2,3}
- ◆ It also may help prevent acne and control the activity of oil glands³. It also aids in the synthesis of protein and collagen formation, promotes a healthy immune system, aids in wound healing and allows for enhanced vision, taste and smell.³⁻⁴
- ◆ Zinc is also a component of insulin and many vital enzymes.²⁻³ It also will fight and prevent against the formation of free radicals. Zinc also increases the absorption of vitamin A.³

Requirements:

The RDA for zinc is as follows⁴:

Category and Age:	RDA (milligrams):
Infants	5 mg
Children <10 years,	10 mg
Males >10 years	15 mg
Females >10 years	12 mg
Pregnancy	15 mg/day
Lactation:	
First 6 mos.	19 mg
Second 6 mos.	16 mg

Zinc

Signs of Deficiency:

Symptoms include: retarded growth, delayed sexual maturity, prolonged healing of wounds, diminished taste or smell, brittle and thin nails, acne, fatigue, hair loss, high cholesterol levels, poor night vision, impotence, increased susceptibility to infection, infertility, poor memory, propensity for diabetes, prostate problems, poor appetite, recurrent colds and flu, skin lesions.¹⁻⁴

Note: Several factors increase the need for zinc including alcohol consumption, smoking, physical and mental stress, fatigue, susceptibility to infection, and injury.¹

Safety:

People who are sensitive to zinc-containing supplements should avoid zinc. Pregnant women and nursing mothers should not exceed the RDA.

Signs of Toxicity:

Excessive intakes of zinc can interfere with copper and iron metabolism and can be immunosuppressive. Symptoms of toxicity include: gastrointestinal upset, dizziness, nausea, impaired immunity, adverse changes in HDL/LDL cholesterol levels.² According to *Prescription for Nutritional Healing*, an individual should not consume more than 100 mg of zinc per day. Doses under 100 mg enhance immune function while dosages of 100 mg or more have the opposite effect.³

Current Research:

Arthritis: Preliminary evidence reveals that zinc deficiency may play a role in rheumatoid arthritis. Diminished plasma zinc has been reported in some with this disease.

Blood Sugar: A zinc deficiency directly affects the way the body handles glucose, according to the results of an animal study published in *Pediatrics Annals*. Examinations of rat livers show that when a zinc deficiency exists, a zinc-dependent enzyme (a branch-point enzyme), which acts as a railroad-type switch determining the reaction between energy burning and fat storage, becomes inactive. "The result is that glucose is shunted toward making triglycerides [blood fats] that can be stored in the fatty tissues rather than being burned for energy."⁴

Colorectal Cancer: One of the functions of zinc is that it's involved in cell growth, including colorectal epithelial cells. Several epidemiological studies have demonstrated a link between blood zinc concentration and the development of certain cancers. A new study published in *Trace Elements and Electrolytes* adds further supporting evidence of this link reporting that patients with cancer and polyps of the colon had significantly lower zinc levels compared to healthy, cancer-free individuals.⁵

Endurance: Active adults who don't get enough zinc in their diet may suffer diminished cardiovascular fitness and physical endurance, according to a study published in the *American Journal of Clinical*

Zinc

Nutrition. Researchers reported that fourteen active young men fed a nine-week diet low in zinc (3.5 mg of zinc in food) experienced increases in heart rate and a decline in breathing efficiency. During a 45-minute endurance ride, four of the nine men had to stop. Zinc appears to affect fitness and endurance through an enzyme called carbonic anhydrase, which helps the body rid itself of carbon dioxide that naturally increases during exercise. During the low-zinc diet phase, the men's enzymes were less active and the result was that during exercise, they were not as efficient in removing carbon dioxide. The study appears to corroborate prior studies showing an association between zinc intake, exercise capacity, and muscle strength.⁶

Immune Function: The thymus, a gland located in the chest, distributes and nourishes T-lymphocytes, or white blood cells, that are the body's first defense against invading bacteria, virus or cancer cells.⁶ The thymus is full of zinc, which is necessary for cell division and protein synthesis. The thymus also secretes FTS, a zinc-dependent hormone important for immunity. Researchers have found that even marginal deficiencies of zinc impair FTS activity. Elderly individuals and persons with Down's Syndrome lack both FTS and zinc. When Down's syndrome children were administered 1 mg of zinc per kg of body weight, the children suffered less infections and missed fewer days of school.⁵ "Though zinc gets little attention, it is critical for to a healthy body," writes Micahel Janson, M.D. First, it helps the body fight germs that can cause a host of unpleasant illnesses from strep to influenza. Recently, researchers discovered that the thymus gland, which is responsible for controlling the body's immune system functions, is affected by the amount of zinc in the body. At birth, this gland weighs almost one-half ounce, but shrinks as we age. Scientists and doctors long believed this was a normal process, but a recent animal study in which zinc supplements were administered to mice showed zinc was associated with restored thymus gland functions and, most surprising, its regrowth. Based on this study, researchers concluded that age-related shrinkage of the thymus gland could be reversed with zinc supplements.⁷

Fertility: Sperm contains significant amounts of zinc. One researcher found that 10 to 15 percent of patients tested at an infertility clinic had very low levels of zinc.⁶

Pregnancy and Nursing: Zinc performs numerous functions during pregnancy. A zinc deficiency during pregnancy can have serious effects on the growth of the fetus and newborn. For instance, it can be teratogenic, producing neural tube defects, according to the *Physicians' Desk Reference*. For nursing mothers, some studies show that giving nursing moms 15 mg of zinc daily resulted in more weight gain in their babies compared to the babies of non-supplemented mothers. Zinc supplementation in non-breast fed infants has also shown benefits.

Zinc

Obesity: Platon Collip, M.D., former professor of pediatrics at State University of New York, Stony Brook has found that children deficient in zinc might not be able to discern the difference between feeling hungry versus feeling full. Zinc-deficient children do not appear to rely on internal cues to stop eating. “I think a zinc deficiency may also affect some part of the brain involved in the self-monitoring of the body, a kind of satiation center that lets you know when you’ve had enough to eat or drink.”⁸

Osteoporosis: Zinc-dependent hormones are also involved in bone metabolism. Currently researchers postulate that zinc may help weak bones attract calcium. Researchers in Turkey demonstrated that persons with osteoporosis had 25 percent lower levels of zinc than those without osteoporosis.⁸

Taste: Some individuals suffer from an inability to detect flavors and odors, which can cause an individual to no longer derive pleasure from eating their favorite foods. Illnesses such as the flu or even physical and mental stress can decrease the body’s ability to detect certain flavors. However, according to researchers at the USDA’s Grand Forks Human Nutrition Research Center, zinc, copper, magnesium, and nickel have been found to improve taste and smell in individuals with impaired senses. According to Forrest Nielsen, taking supplements of these elements for a short time may be one way to restore taste and smell.⁹

References:

1. Medical Economics Company. (2001) Zinc. In: *Physicians’ Desk Reference* (1st ed., pp. 535-40). Montvale, NJ: Medical Economics Company.
2. Dunne, L.J. (1990). In: *Nutrition Almanac*, (3rd ed., pp. 90-92). New York, NY: McGraw-Hill Publishing Company.
3. Balch, J.F. and P.A.(1997). In: *Prescription for Nutritional Healing* (pp. 29). New York, NY: Avery Publishing.
4. Cousins, R. Zinc. American Society for Nutrition. Retrieved from: <http://www.jn.nutrition.org/nutinfo/content/sodi.shtml>.
5. Zowczak-Drabarczyk M, Torlinska T, Iskra M, Mielcarz G, Matylla G, Torlinski L. Serum zinc concentration in patients with colorectal cancer. *Trace Elem Electrolytes*. 2004; 21(4):236-39.
6. Lukaski HC. (2006) Low dietary zinc decreases erythrocyte carbonic anhydrase activities and impairs cardiorespiratory function in men during exercise. *Amer J of Clin Nutr*;2004; 81(5):1045-51.
7. Janson M. (1997). Zinc—the immune system’s missing link? Healthwell.com. retrieved October 1, 2004 from <http://www.healthwell.com/hnbreakthroughs/dec97nutrienprofile.cfm?path=hw&cond=15&mcat=58>.
8. Prevention Magazine. (1988). In: *Complete Book of Vitamins and Minerals* (pp. 216-27; 485-88). New York, NY: Rodale Press.
9. Nielsen F. (2004) Increase your dining pleasure with essential nutrients. Retrieved September 13, 2005 from http://www.gfhnrc.ars.usda.gov/news/news_0312a.html.