



Healthy and Happy Monthly Newsletter

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Consider Zinc for a Body in Sync: It Serves Many Functions, More Than You Might Think

As deficiencies go, one of the last minerals or vitamins that you will see listed on an everyday multivitamin is zinc, but its importance as a trace mineral in the body is a fact that should not be underestimated. It is called a trace mineral because only small amounts are needed in the body to maintain optimal health, and yet zinc is involved in hundreds of enzymatic functions and is present in every living cell that makes up the body. Would you be interested to know that zinc deficiency is becoming more common in the United States and around the world today, and with more pollution and nutrient deficient foods, now is the time during our evolution when we as a civilization are in need of it the most? If so, read on as we highlight and explore the health benefits of zinc, and discuss the consequences that prolonged zinc deficiency can have on the human body by increasing the incidence of disease, cancer, and DNA manipulation.

Until recently, zinc was under the radar as far as a mineral deficiency in humans. Taking supplements was unheard of, as the majority of people either grew their own produce, or purchased fruits and vegetables from local farmers whose harvest were the main source of zinc and other essential minerals and nutrients. With modern conventional farming, foods have become increasingly mineral and nutrient deficient over the last century due to mineral/nutrient deficiencies in the soil. In fact, zinc deficiency is crop plants most significant mineral deficiency, especially in high pH soils. By some estimates, from garden to gullet, the preparation of these foods by processing or cooking depletes them of up to 90% of the original nutrient/mineral content. Therefore, not only are our foods unfit to sustain optimal human health as they once were, but we make them even less nutritious when they are not consumed in the raw form.



Similar to calcium, magnesium, phosphorus, iron, and other essential minerals, the chronic deficiency of zinc can lead to health complications, especially in children and the elderly. The latest statistical data indicates that nearly two billion people in the developing world are zinc deficient today. In the United States, around 12% of our citizens are likely deficient, and up to 40% of our elderly, whose ability to absorb this essential nutrient decreases with age. These statistics may prove to be much higher if zinc testing were more common and if the methods used to test were more accurate.

Other individuals who are at increased risk for zinc deficiency include alcoholics, anorexics, and people on restricted diets like vegetarians and vegans. Also, people with malabsorption disorders like Crohn's and celiac disease may also be deficient in zinc. As discussed in the May 2012 newsletter, *The State of Gut Health in America*, if gut health is compromised then the body will be less likely to properly absorb nutrients taken in from food, and several deficiencies will occur.

After iron, zinc is the second most common trace element found in your body. It is present in every cell, and plays a role in supporting everything from the immune system and reducing the duration of the common cold, to treating depression and reducing the risk of developing certain cancers. In addition to poor diet and malabsorption, zinc deficiency can develop due to a number of factors. Some of the most common contributors to zinc deficiency are the consumption of alcohol, coffee, and soda. Each of these liquids is concentrated with substances like sugar, that the body must dilute, and in the process minerals and nutrients like zinc are deleted, and dehydration and cortisol production is increased.

If you recall from the August 2012 Newsletter, The Powerful Potential of Proper Hydration and Electrolyte Balance, water is essential for proper nutrient absorption and detoxification. With dehydration the body will experience disrupted nutrient absorption and detoxification. Ultimately, chronic dehydration will lead to a systemic malfunction of the metabolic engine that influences every one of the body's biological functions.

Increased cortisol production can weaken the activity of the immune system. Interestingly, with elevated levels of cortisol come increased sugar cravings, and the more sugar that you consume, the more zinc deficient you become. This depletion occurs because sugar binds with zinc, and then it is excreted from the body

Another major contributor to zinc deficiency is the presence of plasticizers in our everyday environment. Plasticizers are solvents that are added to other synthetic resins in the production of plastics to make them more flexible and reduce brittleness. We are exposed to plasticizers in our food, which is packaged in plastic containers and plastic wraps, and through the use of detergents, cosmetics, soaps, shampoos and conditioners, all of which are stored in plastic containers as well.

Prescription medications can also play a major role in creating mineral/nutrient deficiencies in the body. For example, many diuretics that are used to treat high blood pressure, a symptom of metabolic syndrome, will cause mineral depletions. HCTZ, or hydrochlorothiazide, is probably the most often prescribed medication for managing hypertension and has a direct link to zinc deficiency. Beta blockers also create a depleted zinc status. Pointing out the mineral/nutrient depletion potential of such prescription drugs is not meant to downplay their importance as life saving medications. But, it is important to be aware of drug/drug interactions and depletions so that the proper steps may be taken to add supplements like zinc to your daily regimen so that deficiencies and associated complications are less likely to occur. To request an assessment of your medications and possible mineral/nutrient depletions, just call us or come into the pharmacy and we will be glad to help.



Add nutrient deficient and over processed food, concentrated liquid refreshments, environmental pollution, plasticizers, and prescription medications together and it is not difficult to connect the dots to see how the majority of the American population may be at risk for zinc and other mineral/nutrient deficiencies.

The symptoms of zinc deficiency include loss of appetite, poor growth and slow healing, weight loss, lack of taste or smell, skin problems like acne, dermatitis and psoriasis, hair loss, lack of menstruation, night blindness, white spots on the fingernails, and depression just to name a few. The following are all biological functions that can be strengthened or weakened due to zinc sufficiency or depletion.

Zinc is absolutely essential for the immune system, and a zinc deficiency can disrupt multiple aspects of the body's innate and adaptive immunity. Innate immunity occurs naturally as a result of a person's genetic and physiological makeup, and not the result of any infections or vaccinations. Adaptive immunity is composed of specialized cells and processes that eliminate and prevent pathogenic challenges and opportunistic infections. The adaptive immune system is activated by the innate immune system, and it provides the innate immune system with the ability to recognize and remember specific pathogens, to generate immunity, and to mount stronger attacks each time the invader is encountered in the future.

One of the most critical functions in maintaining life is the ability and desire to eat and drink. If nutrition and fluids are not consumed, then death occurs. Two mechanisms by which nutrient consumption occurs are the ability to smell/taste what is being eaten and the thirst sensation. Zinc is necessary to support smell and taste sensitivity due to a zinc dependent enzyme, called carbonic anhydrase. If zinc is not present in the body in sufficient amounts this enzyme does not function properly and its production decreases. The result is that the animal or human loses the ability to taste and smell, no longer has the desire to eat, suffers from malnutrition and eventually dies.

Most commonly, the elderly experience a decrease in the thirst and hunger sensation as they age. If you are a senior, you may notice that your appetite has sated, you enjoy sweeter and saltier foods, and that you are not often thirsty. As humans age, stomach acid production decreases and mineral/nutrient absorption is inhibited. The result is that deficiencies develop. These deficiencies are further accentuated by the symptoms of decreased hunger and thirst sensation, which cause elderly individuals to lack the desire to eat and drink on a routine basis.

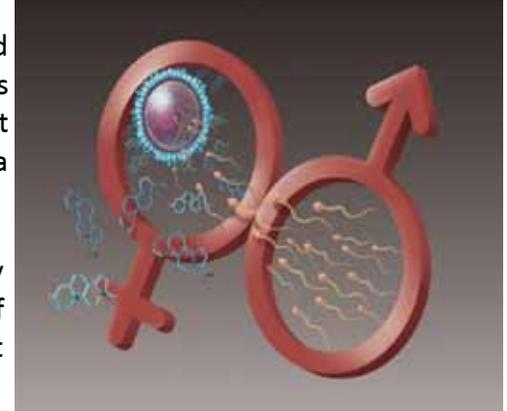
Zinc supports fertility, and increases the likelihood of healthy reproduction. When it comes to fertility, zinc is one of the most studied minerals. This is due in to the fact that zinc plays an important role regulating gene expression and supporting healthy cell growth. This means that a zinc deficiency can alter the chromosomal makeup of either the mother or father, reducing fertility and increasing the risk of a miscarriage.

Epigenetically speaking, one research study concluded that gestational zinc deficiency in lab mice not only depressed the immune function of the offspring of these mice, but that the compromised immune function was found in the second and third generation, even though these mice had been supplemented with sufficient zinc in their diet. Interestingly, this epigenetic evidence is an echo of a centuries old Hopi Indian proverb which states: **before you do anything, consider its effect on the next seven generations.**

For women, zinc is instrumental in helping your body to utilize the female hormones estrogen and progesterone. A zinc deficiency can lead to a hormone imbalance, abnormal ovarian function, and menstrual irregularity. Also, when your body is deficient in zinc, it is likely deficient in other essential minerals and nutrients as well. In particular, this will affect the metabolism of protein and in turn yield lower egg quality.

In pregnant women, low levels of zinc can result in stretch marks and increased irritability. Post natal depression may be more likely. Infants of zinc deficient mothers may be more likely to develop acid reflux or colic, and may require more frequent feedings and experience poor sleep quality. Pregnancy and breastfeeding require a higher level of zinc intake to both protect the mother and provide for the infant.

For men, zinc is found in high concentrations in the sperm, with zinc deficiency having a significant effect on sperm count. Also, zinc is essential in the formation of the outer layer and the tail of the sperm. Therefore, if a man is deficient in zinc, it can affect both sperm quality and quantity.



Zinc deficiency is a risk factor for developing osteoporosis. Zinc is an essential mineral in the formation of bone and the process of bone remodeling. Otherwise known as bone metabolism, bone remodeling is the process whereby mature bone tissue is removed from the skeletal structure and new bone tissue is formed. Zinc is necessary in the structural stability of bone, and it is involved with the enzymes that act to recycle worn out portions of bone protein, and heal injured or broken bones that are in need of repair.

Bone is a connective tissue that consists of organic and inorganic material. The organic material consists of collagen, and the inorganic material consists of the mineral calcium hydroxyapatite. Along with Vitamin C, zinc is instrumental in forming collagen tissue. Like Vitamin C, humans do not synthesize zinc, and so both must be obtained from sources outside the body. Collagen is the most widespread tissue in the body. It is the structure that holds your bones, organs, and all of your body's tissues together. Like bone, collagen matures and ages over time and is metabolized by enzymes and replaced with new collagen tissue. A zinc deficiency will inhibit the synthesis of new collagen, and so bones and all of the body's tissues will be detrimentally influenced as a result.

Your skin is your body's largest organ and it is in a constant state of repair. Zinc is necessary to repair damaged tissues and hasten the healing of wounds. In relation to collagen synthesis, a growing body of research indicates that zinc can be particularly effective in treating topical skin irritations and inflammations such as acne, skin sores, and slow healing wounds by promoting the regeneration of new skin cells. Not only can zinc reduce the proliferation of new acne, it can repair the damaged skin around old acne. Also, zinc appears to help with diaper rash, and protect skin from the damaging ultra violet rays of the sun. It is for this reason that you will see zinc as an ingredient in many diaper rash treatments as well as being a primary ingredient in many sunscreens.

The anti-inflammatory properties of zinc are shown to reduce inflammation in the gut and joint tissues, specifically with the autoimmune disorders Crohn's disease and rheumatoid arthritis. Crohn's disease, also known as inflammatory bowel disease, occurs when the lining of the digestive tract becomes inflamed and damaged, disrupting the normal functioning of the digestive system. When this occurs, the tight junctions of the mucosal intestinal lining that open and close to let in nutrients remain open and increase in size, allowing bacteria, toxins, and partially digested food to leak in at will. The result is that the body produces antibodies to what it once regarded as harmless food and nutrition. This is how food sensitivities develop, and how new inflammatory symptoms with other organs develop, like rheumatoid arthritis and fibromyalgia.

Zinc deficiency has been reported in people with rheumatoid arthritis. An autoimmune disorder, rheumatoid arthritis occurs when the body's immune system mistakenly attacks its own tissues. Rheumatoid arthritis is a chronic inflammatory disorder that affects the small joints in your hands and feet. Unlike osteoarthritis, damage caused to joints and bones by wear and tear, rheumatoid arthritis affects the lining of the joints, causing swelling that can result in bone erosion and joint deformity. Some research indicates that supplementing with zinc can actually reduce the symptoms of rheumatoid arthritis, which makes sense due to zinc's tissue repair and anti-inflammatory properties.

Zinc is highly concentrated in the prostate, and characteristically low in individuals with prostate cancer. In addition to all of the information presented above, a zinc deficiency has been established as a general cancer risk factor in animal and human subjects. On a cellular level, clinical research has indicated that the concentration of zinc within cells significantly influences a cell's ability to repair DNA damage and recover. With this in mind, it is important to understand that although research shows that zinc is an essential mineral needed to control initial prostate swelling that if left untreated can eventually lead to cancer, zinc does not stop or cure prostate cancer once it starts.

Tobacco use and cigarette smoking has been clinically shown to deplete zinc and increase the concentration of cadmium in the body's cells. In fact, research indicates a low zinc/high cadmium ratio is higher in smokers when compared to non-smokers. The combination of zinc deficiency along with a low zinc/high cadmium concentration in cells appears to be the central factor in smokers that leads to increased oxidative stress, DNA damage, mutation, and impaired DNA repair. This evidence suggests that the high cadmium to zinc ratio is a critical determinant for the risk of prostate cancer in smokers, as well as several other cancers.

Interestingly, cadmium that is ingested from cigarette smoking accumulates in bone while it displaces zinc from the bone, which is one reason why smokers have poor bone health and are at increased risk for osteoporosis as they age. But the fun does not stop there. As individuals approach the age of 50 and begin to lose peak bone mass at an accelerated rate, the cadmium that accumulated in the bones for many years comes back into the general blood circulation and can enter the brain causing Parkinson's and other neurological disorders. Cadmium is highly toxic to nerves and the nervous system in general. Zinc is required to run the metalloenzyme system which is responsible for clearing toxic metals such as cadmium out of the body. This means that elderly smokers and former smokers especially need to supplement with zinc simply to prevent nerve poisoning from cadmium toxicity, as well as to support existing bone health.

Finally, it is known that exercise and sweating depletes zinc and other mineral salts, and severe zinc deficiency can compromise muscle function. Recently, the enzyme carbonic anhydrase that was mentioned above with regard to inhibited taste and smell sensation was also linked to exercise. Research indicates that exercised induced zinc deficiency, accompanied by insufficient follow-up zinc supplementation induced test subjects to become out of breath quicker and their heart had to work harder to complete exercise routines. Once zinc supplementation was introduced, and levels returned to normal, the subjects were able to exercise at optimum performance. It was concluded that not only does zinc help to improve muscle function; it can improve oxygen rich blood flow to muscle cells as well.



The desired dose of zinc for supplementation will vary from person to person depending on diet, lifestyle, stress, and metabolic absorption. Typically men have a slightly higher need than women, unless the woman is pregnant or nursing. A typical dose can be anywhere from 15mg to 50mg a day, preferably in divided doses with meals. During times of unusual stress, like when you have a cold or flu, zinc is depleted more fastidiously, so supplementation at this time can be especially beneficial. The most well absorbed oral zinc supplements include zinc citrate and zinc picolinate.

One of the simplest and most effective ways to screen for a zinc deficiency is to take the zinc taste test. The following is a short version of the instructions for taking the test: Place a small amount of liquid zinc, approximately 1-5mL, into your mouth. If you taste a strong metallic taste immediately then you have sufficient zinc stores and are not zinc deficient. If you do not taste it, and you begin to taste it after about a minute, then you should start to supplement with zinc. If it tastes like water and you do not taste anything after a minute or longer, then you are likely zinc deficient, and you should start to supplement with zinc.

If you do find that you are zinc deficient, consider the hundreds of enzyme systems that depend on zinc and cannot function properly without it. Consider your immune system, your bones, and your skin. Consider your genetics and the genetics of those who will come after you, and think zinc.