

Zinc, Essential for Hormones and Growth

One of the common misconceptions in modern times is our belief that knowledge, like technology, seems to grow in a perfectly linear forty-five degree angle in an ever-upward march towards the ultimate answer. Unfortunately, rarely is this ever the case in the field of natural sciences. Advancement is typically made through milestone discoveries, sometimes by accident, mostly through hard-fought battles and tedious scrutinization of seemingly random bits of information.

And so it is with the history of zinc. The majority of our knowledge about the health effects of elemental zinc come from a major study conducted in the early 1960s in Iran by Ananda S. Prasad, M.D., Ph. D, and her colleagues. They studied eleven Iranian male dwarfs who were determined to have several major deficiencies including iron and zinc. The symptoms of this deficiency included dwarfism by the age of twenty, lack of mental acuity, and infantile sex organs. Supplementation of iron until the deficiency was corrected did not yield any improvement in symptoms.

In a later study, conducted on seventeen Iranian male dwarfs were this time separated into two groups and monitored. The first group was fed a standard hospital type diet. The other group was given the standard diet plus an additional 100mg of zinc sulfate per day. The first group developed normal sexual function within 224 days. The group that had the zinc supplement took no longer than 59 days, four times faster than the standard group. Also, another interesting effect of the zinc was an increase in height. Because the growing ends of the long bones had not yet closed, these twenty-year old dwarfs on the standard diet grew in height by an average of 4.2 cm. Those on the supplemented diet grew on average 10.5 cm, over twice as much.

Obviously, a diet severely deficient in zinc was the prime culprit in the various conditions of these Iranian dwarfs. But this begs the question: why were the men of this particular region more likely to be zinc deficient than other people? A perusing of their lifestyle will shed some light on this. These men grew up in Iranian villages out in the country where they subsisted mostly on unleavened bread (cooked without yeast) like naan. This type of bread contains phytate, which is a compound that prevents the absorption of zinc. The biochemical process that leavens bread destroys the phytate. An eager person might conclude that this alone was the reason

for the severe deficiencies of zinc in this region, but that is not the case.

Nearly every food in the human diet contains at least some trace amounts of zinc, some sources are richer than others. Oysters, for example, are one of the richest sources of zinc and this may even be the reason it is thought to be an aphrodisiac. Animal flesh, in turn, is also abundant in zinc. The most commonly consumed source of zinc, however, is from vegetables, nuts, and grains. The zinc content of such food sources is dependent upon the zinc content of the soil it grows in. When a crop containing 100ppm of zinc is harvested from a field, the soil will lose 1ppm of zinc. The average soil only contains 50ppm of zinc, and will thus become depleted by an annual crop in fifty years. In regions like Egypt, Iran, and Iraq, where agriculture has existed for centuries, the level of soil zinc depletion is great and it is this complete lack of zinc in the soil that has led to the commonality of zinc deficiency symptoms in a large share of the population.

Even the United States, one of the youngest countries in the world and possessing some of the least exploited arable land in the world has also seen its share of zinc deficient members of the population. Thankfully, there has been some understanding of the effects of zinc deficiency, particularly in farm animals that many farmers have added zinc to the diets of their livestock and added it to the fertilizer to maintain the soil.

Steps like these, though not a complete solution, are very important because zinc is an extremely important element for adequate health. Even though there is only about 2-3 grams of zinc in your entire body, about three large paper clips, it is necessary for the proper function of over 20 different enzymes, and in the synthesis of DNA and RNA. This might explain why zinc deficiency has such a pronounced effect on growth and development.

Because zinc is utilized in so many different areas of the body, this also means that there is no real storage place for extra zinc and the body needs a continuous supply of it in order to keep all the systems running smoothly. This in turn contributes to the reason why mild symptoms of zinc deficiency are becoming more and more commonplace among individuals with poor diets and high zinc demands.

The following are some of the symptoms associated with a minor zinc deficiency:

- Impaired healing ability
- Reduced sense of taste and smell
- Reduced appetite
- Impaired night vision

More severe deficiencies can result in:

- Mental disturbances
- Lethargy or apathy
- Stunted growth
- Skin problems
- Weakened resistance to infections
- Impaired testicular function
- Irregular menstruation

Zinc deficiency during pregnancy has also been correlated to:

- Birth defects
- Miscarriages
- Pregnancy complications.

Probably the two most common and easily recognized signs of zinc deficiency are reduced sense of taste and white spots on the fingernails.

The first, sense of taste, is commonly seen in the elderly who, along with poor diet, also tend to have an impaired digestive tract which decreases their ability to break down and absorb zinc from dietary sources. They often also have a lesser appetite that may also stem from their lack of taste, which either renders them unable to taste many flavors, or makes certain flavors taste strange or foul. Maintaining proper bodyweight under these circumstances is also difficult. This makes inability to gain weight another symptom of zinc deficiency.

The other common telltale of zinc deficiency is white spots and pattern on the fingernails. These can occur on any finger on either hand, but is more commonly seen on the dominant hand. These white patches can range anywhere from single spots to bands across the whole nail to even an entirely white fingernail, which is usually seen in elderly individuals. Typically, the white patch forms under the skin and then becomes visible as a traveling white spot as the nail grows forward. It typically takes about 5 to 6 months for an adult nail to grow from the cuticle to the tip of the finger. The white patch will form as long as a zinc deficiency exists and pink nail tone will resume once the deficiency has passed. There was one individual who brought this to my attention in a clever way. They noticed a white band on their left thumb nail about in the middle. They thought back to what had occurred about 2

to 3 months prior and realized that it was during that time that they had suffered a series of injuries from a minor car accident. Mostly scrapes and a little trauma to the knee but nothing permanent or disabling. It was apparent that during that time a large amount of zinc was being summoned to the wounded areas while other parts of the body were being neglected. After a few days of recovery, the body's zinc demands went to normal and the pink color returned to the nail. This goes to show that the finger nails can also be a good record keeping device for historical zinc levels in the body over the course of 6 months or so depending on the length of the nail. Various patterns can indicate frequencies of zinc deficiency or specific events, such as the car accident.

In the event of injury, not only does zinc assist in the repair of the damaged tissues, it also helps fight infection by strengthening the immune system, which it does by helping various cells in the immune system function in top form. Zinc is also very effective at reducing inflammation in the body, which is one of the reasons that it is used as the main ingredient in calamine lotion to help reduce the redness and inflammation from sunburns, poison ivy and other causes of redness, itchiness, and inflammation. Zinc compounds are also used in some shampoos to help get rid of dandruff as well.

Zinc, along with improving our sense of taste and smell, it also improves our sight by increasing the availability of vitamin A in the function of the retina and other parts of the eye. This is one of the reasons that improved night vision occurs with restored zinc levels. In fact, in ancient Egypt, a common cure for poor night vision was the consumption of goat liver. Liver is a naturally abundant source of vitamin A, but it is also rich in zinc as well.

Zinc also plays a critical role in the effectiveness of testosterone, thyroid hormones T3 and T4, human growth hormone (HGH), and insulin in the synthesis of protein. This is one of the reasons why diabetics have difficulty producing proteins, as well as maintaining normal zinc levels. Zinc is needed for the proper function of insulin, which is already compromised in the diabetic and a kind of vicious cycle develops because insulin is required to breakdown the zinc within the food consumed. When zinc is supplemented, especially in a form that is bound to arginine (an amino acid that increases growth hormone production and insulin release), the zinc is then able to prevent protein degradation which is an important function for diabetics.

Zinc in this form is also one of the most easily absorbed forms. There are many different forms of zinc, but not equally absorbable.

Among the most absorbable forms are zinc arginate, zinc picolinate, and zinc glycerinate.

In a test on zinc, muscle test, and endurance, neither dynamic (isokinetic) nor static (isometric) strength or endurance changed after placebo treatment in a double-blind cross-over study. With zinc intake, a significant increase in dynamic strength was observed with an associated increase in static endurance. Exercise in itself also places a greater demand for zinc upon the body because of the need to repair muscle tissue from the type of damage sustained from rigorous exercise. This means that without sufficient zinc intake, there is the potential for a *decrease* in strength as well as muscle mass from rigorous exercise in the presence of a zinc deficiency.

Another interesting phenomenon of zinc is that it also has protective characteristics. When the body is exposed to various toxins, including chemicals and heavy metals, the body utilizes a number of systems and nutrients to process and excrete the harmful substances with the least amount of damage and exposure to the body. Zinc plays an integral part on this process. Lead and cadmium, two heavy metals that are both commonly encountered in most people's everyday lives. Both are found in car exhaust and in industrial wastes. Zinc prevents the absorption of lead and cadmium before it can do damage to the body, particularly to the liver. There is another metal, however, that has a natural rivalry with zinc. Copper, in a bizarre way, could be considered a nemesis of zinc and sometimes the other way around. Zinc and copper exert influence upon each other in an attempt to reach a kind of equilibrium in the body. When zinc levels are low, copper levels are usually high in the absence of its primary antagonist. It is in this state that often times various form of cancer develop. In 1981, a study was conducted on individuals with a particular form of lung cancer, and it was found that those with higher levels of zinc in their blood stream had a tendency to live longer. It is also no surprise that low zinc levels also exists in individuals with AIDS, and since the benefits of zinc on the immune system are becoming more and more recognized by the greater medical community, there are also increasingly greater demands for research into the potential benefits of zinc supplementation on immune deficiency disorders.

The RDA for zinc is 15mg per day for men, 12 mg for women, 20mg for pregnant women and 25mg for lactating women. It is important to

realize though that individuals with certain medical conditions may have an impaired ability to absorb zinc properly and may need to take amounts that exceed the RDA. There are many medical professional who would also recommend dosages up to 250mg per day for various medical conditions and it is important to consult a qualified medical professional to determine what dosage would be appropriate for your particular situation.

It should be entirely apparent to you by now that zinc is an integral part of maintaining, and/or obtaining optimum health and that the only way to achieve this is through a healthy balanced diet and proper supplementation of an absorbable form of zinc. And even though zinc is generally safe to consume, even at dosages of 250mg per day, there are limits to how much zinc someone should consume at a given time. There is a case that I have come across where a young teenage boy heard that zinc promoted rapid wound healing. He was eager to get better as fast as possible and so did a very foolish thing. He had recently purchased 12 grams of pure zinc to use as fuel in his toy rocket. Instead he mixed it in peanut butter and ate all of it with bread. The next day he had difficulty waking up and staying awake. He fell asleep in school. His sleepiness persisted for four more days and on the fifth day he was taken to a local hospital. Other than extreme sleepiness, he had very few other impairments. His reflexes and speech were normal and he could successfully complete several psychological tests. Most likely the peanut butter reduced that speed of the zinc absorption because of the high fat content. Also, the zinc was of very high purity otherwise he might have gotten poisoned from some of the common by products of industrial zinc like cadmium which is very poisonous in high doses. If this type of procedure were safe we might see insomniacs dosing themselves with peanut butter and zinc, but this is something I definitely do not recommend. Other than that, zinc is generally safe, and, in most cases, extremely beneficial.

If you wish to find out about your Zinc levels please contact our office. We can test for Zinc and other minerals.



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