ZINC DEFICIENCY, METAL METABOLISM, AND BEHAVIOR DISORDERS

by

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Introduction

Most Americans receive all the zinc they need if they have a reasonably well-balanced diet involving the major food groups. However, many persons are born with a metal-metabolism disorder which results in zinc depletion regardless of diet. Recent research has shown zinc to be far more important than previously believed.

Zinc is a component of more than 80 enzymes. High concentrations have been found in brain hippocampus, and many medical researchers believe that zinc is a neurotransmitter. The discovery of zinc "finger proteins" in the past decade has led to a vastly improved understanding of how cells replicate and divide. It is clear that human beings cannot function properly without enough zinc.

Zinc Deficiency and Behavior Disorders

Many of the patients of the Carl Pfeiffer Treatment Center suffer from behavior disorders. These patients typically present with a history of extensive counseling and multiple medications and many have experienced residential care. They represent a narrow and rather uncharacteristic segment of the general population.

A high percentage of behavior-disordered persons exhibit abnormal trace metal levels in blood, urine, and tissues, based on chemical analysis results from thousands of patients. This condition appears to involve a malfunction of the metal-binding protein, metallothionein. Most of these patients have symptoms of zinc deficiency along with depressed levels of zinc in their blood plasma.

The high incidence of zinc deficiency in assaultive young males was illustrated in a recent study (Reference 1) which found elevated serum copper and depressed plasma zinc concentrations, compared to normal controls. This study confirmed prior clinical observations of zinc depletion in more than 4,000 behavior-disordered patients.

Zinc deficiency often results in elevated blood levels of copper, due to the dynamic competition of these trace metals in the body. Elevated blood copper has been associated with episodic violence, hyperactivity, learning disabilities, and depression. The copper/zinc ratio appears to be more decisively important than either of the individual metals alone.
Diagnosis of Zinc Deficiency

Zinc deficiency is difficult to diagnose since no single laboratory test or combination of tests is decisive in every case. For example, blood levels are sometimes normal in zinc-deficient persons due to homeostasis. Urine and hair tissue levels are often elevated in zinc deficiency because of "short-circuiting" of zinc through the body and high rates of excretion.

The two principal factors which lead our Center’s physicians to a diagnosis of zinc deficiency are: (A) depressed plasma zinc (analysis by Smith-Kline-Beecham), and (B) presence of clinical symptoms of zinc depletion which are alleviated by zinc supplementation (References 2, 3, 4, 5, 6, and 7). Since zinc tolerance tests show plasma levels to be affected for 6 hours following zinc supplementation (References 8 and 9), zinc supplements are avoided for 24 hours prior to sampling of plasma.

The clinical symptoms associated with zinc deficiency or depletion include the following:

--- eczema, acne, and/or psoriasis (References 10, 11, 12, 13, 14),
--- poor wound healing, including leg ulcers and oral lesions (Ref. 15, 16),
--- Lines of Beau on the fingernails (Reference 17),
--- growth retardation (References 18, 19, 20, 21),
--- delayed sexual maturation (Reference 22),
--- hypogeusia or poor taste acuity (References 23, 24), and
--- chronic immunodeficiency and frequent infections (References 25, 26).

A "working diagnosis" of zinc deficiency can be made if clinical symptoms of zinc deficiency are clearly evident from the initial physical examination and medical history. This initial diagnosis is later supported or negated by laboratory analysis for plasma zinc along with observed response (or non-response) to zinc supplementation.

The Carl Pfeiffer Treatment Center generally retests plasma zinc and evaluates symptoms after 4-6 months of treatment to determine if dosages need adjustment.

Treatment of Zinc Depletion

Zinc depletion is corrected by supplementation with zinc (picolinate or gluconate) along with augmenting nutrients including cysteine, pyridoxine, ascorbic acid, and vitamin E. Manganese is also useful in promoting proper metallothionein function. If copper levels are elevated, effective treatment must also enhance the release of copper.
from tissues and copper excretion. Correction of zinc deficiency is best accomplished under the care of a physician or nutritionist who is experienced in metal-metabolism disorders. Indiscriminant dosages of zinc to persons who do not need it can cause anemia and imbalanced trace metals.

Treatment of mild or moderate zinc depletion can take months to complete. Some cases of severe zinc depletion require a year or more to resolve. Achievement of a proper zinc balance is slowed by growth spurts, injury, illness, or severe stress. In addition, persons with malabsorption or Type A blood respond to treatment more slowly.

Zinc deficiency can be corrected, but not cured. If treatment is discontinued, the prior zinc deficiency will re-emerge with all symptoms gradually returning.

Discussion

We find that zinc-deficient individuals usually respond well to inexpensive supplementation with zinc and augmenting nutrients. Many patients who previously experienced years of counseling, psychotherapy, aggressive medication programs, and/or residential treatment become greatly improved and respond to less intensive (and less expensive) therapies.

The Center involves the collaboration of biochemists and medical doctors. We believe that this coupling of disciplines provides an ideal capability for biochemical evaluation and medical treatment.

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REFERENCES


