

ZINC - TRACE ELEMENT

Introduction

Atomic mass 65.4. Zinc is extremely important in providing the catalytic activity of many enzymes. In fact, there are more than 300 zinc metalloenzymes. Additionally, zinc atoms have structural roles in many proteins, for instance the zinc finger motif that is very common in transcription factors.

Pathology

Zinc deficiency may occur through pancreatic disease or insufficiency, malabsorption syndromes, inadequate diet (anorexia, protein-calorie malnutrition, alcoholism), total parenteral nutrition (TPN) with diarrhoea or inflammatory bowel disease. Dramatic loss of zinc may occur during catabolic processes, surgical procedures or severe infections.

Strict vegetarians may need as much as 50% more zinc per day because of the increased phytic acid and fibre in their diet. Acrodermatitis enteropathica is a rare, autosomal, recessively inherited defect of zinc absorption.

The clinical manifestations of zinc deficiency may be quite varied and non-specific, reflecting the wide range of functions zinc performs:

- Impaired growth velocity
- Delayed sexual maturation
- Impotence
- Hypogonadism
- Oligospermia
- Alopecia
- Anorexia
- Diarrhoea
- Dysgeusia (impaired taste)
- Immune dysfunction
- Night blindness
- Impaired wound healing
- Depression
- Various skin lesions (acro-orificial dermatitis, erythematous, vesiculobullous and pustular lesions)

Although zinc toxicity is rare, it most frequently occurs through inhalation or ingestion. Metal fume fever is a syndrome that resembles a flu-like illness with symptoms beginning 4 – 10 hours following exposure to zinc oxide fumes. Symptoms include fever, chills, fatigue myalgia, cough, shortness of breath, leukocytosis, thirst, metallic taste, and salivation. It is usually a self-limited illness with symptoms resolving after 36 – 48 hours. Metal fume fever can also follow exposure to fumes from aluminium, antimony, copper, iron, magnesium, manganese, and nickel in welding or galvanizing operations¹.

Toxicity following acute ingestion of large doses of zinc compound typically induces abdominal pain, diarrhoea, nausea and vomiting. Haematemesis (vomiting blood) can occur in severe cases, especially following ingestion of corrosive compounds such as zinc chloride. Chronic high-dose zinc supplementation can lead to secondary copper deficiency.

¹ Barceloux D, Zinc. Clinical Toxicology. 1999; 37(2):279-292.



Monitoring

Plasma zinc provides a convenient, but limited, marker of zinc status. Hypoalbuminaemia, the acute-phase response, steroid therapy (including oral contraceptive pill use) and pregnancy will lower plasma zinc independently of zinc status. However, concentrations below 7 μ mol/L indicate marked deficiency.

Analysis

Trace Elements analyses zinc using inductively coupled plasma mass spectrometry.

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