

A hand holding a metal rod with a copper tip, set against a blue background. The word "ZINC" is overlaid in red text.

ZINC

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Absorption

- **20%**
- **duodenum and jejunum, competition with Cu**
- **↓ in zinc deficiency, ↑ in ↑ zinc intake, but within 4 days balance occurs again**

Excretion

- **Faeces: 10 mg/d, unabsorbed, bile and pancreatic**
- **Urine: 0.3 – 0.6 mg/d**
- **Perspiration: 2 - 3 mg/d**

Transport and distribution in organism

- in blood binds **albumin** (65%) and **macroglobulin**, **IC metallothionein**
- **75-88% of Zn of blood is in ercs**
- **not stored in the liver**

About 200 of zinc containing enzymes

- alcoholdehydrogenase, LD, GMD, SOD, AST, DNA- and RNA-polymerases, ALP, ACE, kolagenase, karboxypeptidases, aldolases, carbonanhydrase A (first described Zn enzyme, 1936), levulinate dehydratase, AMS, neutral proteases, thymidinkinase,

SOD



- **SOD 1 (cytoplasm), EC-SOD:**
contains Cu and Zn
- **Zn²⁺ - stabilisation function**
- **Cu²⁺ - catalytic function**

Zinc significance

- **stabilisation of protein, RNA, DNA, ribosomes and hormone-receptor complexes structure**
- **stabilisation of cell membranes**
- **facilitates healing**
- **facilitates glucose absorption and linkage of insulin receptors to hepatocytes**
- **antioxidative protection (SOD)**
- **needed for cell proliferation, production of connective tissue and spermatogenesis**
- **facilitates trombocytes adhesion and agregation**
- **needed for cell imunity, increases infection resistance**

Deficiency

- **400 - 700 $\mu\text{g/l}$ weak**
- **< 400 $\mu\text{g/l}$ strong**

- **inborn**

- **obtained**

Acrodermatitis enteropathica

- = **Danbolt disease, AR heredity**
- **clinically manifests with start of cow-milk feeding**
- **symptoms:**
 - *skin rash (red, ichthyotic; extremities)**
 - *cheilitis, stomatitis, glossitis**
 - *blisters, alopecia**
 - *chronic diarrhea and cachexy**
 - *affection of eyes and nails**
 - *immunity disorders**

Causes of obtained deficiency

- **malnutrition (vegans)**
- **malabsorption**
- **insufficient supplementation in long-term parenteral nutrition**
- **↑ loss during catabolism or burns**
- **deficiency in penicilamine, deferoxamine or corticosteroids therapy**
- **↑ requirement in growth, pregnancy, breastfeeding**

Symptoms

- **Growth and sexual development defects**
- **Impair wound healing, skin defects, red skin**
- **Immunity disorders (T-cells) with ↑ infection liability**
- **↓ glc tolerance**
- **Diarrhea, dysorexia**
- **Taste and smell impairment**
- **Spleen and liver enlargement**
- **Night blindness**

Toxicity

- **acute intoxication: nausea, emesis, diarrhea, fever, muscle pain**
- **chronic: copper deficiency (intestinal absorption and transport proteins competition)**

Clinical applications

- healing of burns and skin defects, such as decubiti or crural ulcers
- therapy of Wilson's disease
- therapy of acne and herpetiform dermatitis
- zinc gluconate, ZnSO_4