



# Copper, Iron, and Zinc - an Essential Trio for Health

A **Public Service Series** Publication from ICA's Health and Environment Program



## WHY ARE THESE THREE MINERALS ESSENTIAL?

Copper, iron, and zinc are essential trace nutrients because they cannot be made, or synthesized, in the body. They are needed throughout one's lifetime, but only in small quantities. These essential nutrients have to be obtained from food and drinking water, and occasionally as dietary supplements, and are necessary for the body to function normally. The three minerals are sometimes competitive when iron or zinc supplements are taken, that is, they can either inhibit or enhance each other's absorption.

## HOW MUCH COPPER, IRON, AND ZINC DO WE NEED DAILY?

Recommended Daily Intakes of copper are 1 mg/day for adults, 1.3 mg/day for pregnant and lactating women; for iron, 8 mg/day for men, 18 mg/day for women (27 mg/day in pregnancy); for zinc, 15 mg/day for men, 12 mg/day for women.

## WHY DO WE NEED COPPER?

We need copper for blood vessel formation, a healthy heart, and for stabilizing the collagen, or connective tissue, which binds one part of the body to another. Copper is also needed for brain development and for the effective communication between nerve cells in the brain, as well as for healthy bones and teeth.

## WHY DO WE NEED ZINC?

We need zinc for many biological functions, and because it plays a crucial role in more than 300 enzymes (vital chemicals that speed up the rate of reaction between substances) in the human body. Among zinc's tasks are growth and fertility, a healthy immune system, and healthy skin, hair, nails and eyes.

## WHY DO WE NEED IRON?

Iron is an integral part of many proteins and enzymes that maintain good health such as oxygen transport and the regulation of cell growth. Almost two-thirds of iron in the body is found in hemoglobin, the protein in red blood cells that carries oxygen to tissues.

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**COPPER**

International Copper Association, Ltd.

260 Madison Avenue  
New York, NY 10016 USA  
Tel (212) 251-7240 Fax (212) 251-7245  
www.copperinfo.com

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## HOW DO THESE IMBALANCES BETWEEN THIS ESSENTIAL TRIO OCCUR?

Taking mega-doses (more than 15 to 30 times the Recommended Daily Allowance) of zinc supplements to fight colds and boost the immune system has become very popular. To combat iron deficiency, the most common nutritional deficiency worldwide according to the World Health Organization, supplements of iron are often taken.

## HOW DO COPPER AND IRON INTERACT?

Iron supplements may inhibit intestinal zinc and copper absorption because these elements may compete for binding to a transporter molecule located in the small intestine. Copper-dependent enzymes are needed to transport iron in the body, and a lack of copper causes secondary iron deficiency.

## HOW DO COPPER AND ZINC INTERACT?

It is most likely a combination of two properties of zinc. 1) Zinc causes an elevation of metallothioneins (proteins that bind zinc as well as copper very avidly in the cell). High levels of these copper binders make copper unavailable where it is needed in the body. 2) Copper and zinc compete for absorption from the intestine into the bloodstream, and both are absorbed by the same processes. In fact, zinc is so effective in reducing copper that it is the standard treatment for Wilson Disease, a rare genetic disorder in which copper accumulates in the liver, brain, and cornea.

## WHAT ADVERSE EFFECTS RESULT FROM COPPER DEFICIENCY?

Patients suffering from severe copper deficiency after excessive zinc supplementation developed irreversible neurological symptoms (such as gait abnormalities and painful tingling and numbness). Copper deficiency can also be a risk factor for osteoporosis, rheumatoid arthritis, and cardiovascular disease. Even mild copper deficiency can result in a higher rate of colds and flu, loss of skin tone, reproductive problems, and fatigue.

## SO HOW DO WE STRIKE A BALANCE AMONG THESE THREE ESSENTIAL MINERALS?

It is very important to remember that more is not necessarily better when it comes to any nutrient. For optimal health with regard to the essential trio of copper, zinc, and iron, we should follow the US National Academy of Sciences guideline that for anyone who takes an **iron supplement of 30 mg** or more per day, under supervision of a physician, they should balance it with about **15 mg zinc and 2 mg of copper**. Moreover, pregnant women should consult with their physicians to ensure that their prenatal supplements contain the proper balance of copper, zinc, and iron.