



COPPER IN HUMAN HEALTH

We can't live without it

Copper is one of a relatively small group of metallic elements which are essential to human health. These elements, along with amino and fatty acids as well as vitamins, are required for normal metabolic processes. However, as the body cannot synthesize copper, the human diet must supply regular amounts for absorption.

How much copper in your body?

The adult body contains between 1.4 and 2.1mg of copper per kilogramme of body weight. Hence a healthy human weighing 60 kilogrammes contains approximately a tenth of one gramme of copper. However, this small amount is essential to the overall human well-being.

How does it work?

Copper combines with certain proteins to produce enzymes that act as catalysts to help a number of body functions. Some help provide energy required by biochemical reactions. Others are involved in the transformation of melanin for pigmentation of the skin and still others help to form cross-links in collagen and elastin and thereby maintain and repair connective tissues. This is especially important for the heart and arteries. Research suggests that copper deficiency is one factor leading to an increased risk of developing coronary heart disease.

Do we get enough?

Until recently, it was generally believed that most people consumed adequate quantities of copper. However, modern research has shown that this is not the case. In the United Kingdom and the United States for example, many typical meals have been analysed for their metals content. According to recent surveys, only 25% of the US population consume the amount of copper a day estimated to be adequate by the US Food and Nutrition Board of the National Academy of Sciences. Typical diets in the US provide only about half of this amount and some diets in mainly industrialised countries contain less than 40% of the recommended dietary allowance. In the United Kingdom, it is now recommended that the daily intake should range from 0.4mg/day for 1-3 year old children to 1.2mg/day for adults. In addition, more recent studies are suggesting that there are serious doubts concerning the adequacy of diets containing less than 1mg copper/day for adults.



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Can we have too much?

The World Health Organisation (WHO) and the Food and Agricultural Administration (FAA) are likely to suggest that the population mean intake of copper should not exceed 12mg/day for adult males and 10mg/day for adult females. These are regarded as the lowest intakes likely to produce the slightest biochemical evidence of undesirable effects in all but a small number of members of a population. Sufferers from Indian childhood cirrhosis or hereditary diseases such as Wilson's Disease retain excessive amounts of copper in the body and suffer from liver damage, often with fatal consequences. The symptoms of acute copper poisoning include nausea, vomiting and abdominal and muscle pain. Excess body copper can be removed by means of specific chelating agents or by the consumption of high levels of zinc.

What are copper rich foods?

Some foods are especially rich in copper. These include most nuts (especially brazils and cashews), seeds (especially poppy and sunflower), chickpeas, liver and oysters. Natural foods such as cereals, meat and fish generally contain sufficient copper to provide up to 50% of the required copper intake in a balanced diet. In addition, a further part of the daily intake in the United Kingdom may be obtained from drinking water transmitted through copper pipes. However in most areas, the copper content of water is not sufficient to provide the balance of the required normal daily intake of this element. In addition, it should be appreciated that some water filters are claimed to remove metals including the essential element copper from drinking water.

Copper in medicine

Copper has been used as a medicine for thousands of years including the treatment of chest wounds and the purifying of drinking water. More recently, research has indicated that copper helps prevent inflammation in arthritis and similar diseases. Research is going on into anti-ulcer and anti-inflammatory medicines containing copper, and its use in radiology and for treating convulsions and epilepsy. Although there is no epidemiological evidence that copper can prevent arthritis, there have been claims that the wearing of copper bangles does alleviate the symptoms.

Copper toxicity

Acute copper poisoning is a rare event, largely restricted to the accidental drinking of solutions of copper nitrate or copper sulphate which should be kept out of easy access in the home. These and organic copper salts are powerful emetics and inadvertent large doses are normally rejected by vomiting. Chronic copper poisoning is also very rare and the few reports refer to patients with liver disease. The capacity for healthy human livers to excrete copper is considerable and it is primarily for this reason that no cases of chronic copper poisoning have been reported.

Copper for health

Our daily diet must provide specific trace amounts of copper for a number of reasons in order to maintain human health. Plants and animals also require copper to maintain healthy growth which then benefits humans through the food chain. Copper is readily available in a range of foods and normal balanced diets should provide adequate daily amounts of copper without the need for additional supplements. However, it should be appreciated that changes in eating habits and the introduction of limited medically controlled diets may result in inadequate intakes of copper.

Further reading

- 1) '*Copper and Human Health and Safety*'
George A Cypher, International Copper Association Limited, 260 Madison Avenue, New York, NY 10016, USA.
- 2) '*Copper in Human Health*'
Technical Note TN 34, Copper Development Association, Orchard House, Mutton Lane, Potters Bar, Herts EN6 3AP, UK.
- 3) '*Copper in Plant, Animal and Human Nutrition*'
Technical Note TN 35, Copper Development Association, Orchard House, Mutton Lane, Potters Bar, Herts EN6 3AP, UK.
- 4) '*Copper, The Directory of Nutritional Supplements*'
The Vitamin Connection, January/February 1992.
- 5) '*Dietary Reference Values for Food Energy and Nutrients for the United Kingdom - Report on Health and Social Subjects 41*'
Department of Health, HMSO, London 1991.

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