Copper in multivitamin supplements

Cobre en los suplementos multivitamínicos

Dear Editor,

Copper (Cu) is an essential trace element for humans. The total content of Cu in an adult weighing 70 kg is 110 mg. It is a cofactor in more than 100 enzymes, including those responsible for DNA and RNA synthesis. It plays an important role in protecting ocular tissues from age-related damage. It is located primarily in tissues with melanin such as pigment epithelium. In biological systems it appears predominantly as cupric ion (Cu²⁺). A variety of organisms such as yeast and mammals share mechanisms for Cu metabolism regulation, avoiding excess and deficiency. When Cu intake is high, reduction of the absorbed fraction does not prevent absorption of excess Cu, as passive diffusion plays an important role. Cu absorption in diet depends on a number of factors, such as the diet’s fiber content, phytates and secretions sequestering copper and zinc. Daily Cu requirement amount to about 2 mg daily. Foods that contain the largest amount of this mineral are: viscera, cocoa, nuts, yeast, chocolate, wheat germ, oysters, mussels, meats, whole grains, nuts and legumes. Given its wide distribution, it is impossible to prepare a diet containing less than this amount. In the AREDS study patients with moderate risk of or advanced ARMD in one eye treated with megadoses of antioxidant vitamins and trace elements, reduced the risk of progression by 25% at 5 years. The risk of developing advanced ARMD for patients with early ARMD was 1.3% at 5 years (hence, AREDS supplements are not recommended for people with less advanced stages of the disease). AREDS2 study results changed the formula by removing beta carotene, adding lutein and zeaxanthin and maintaining 80 mg of zinc and 2 mg of Cu. Ishida et al. demonstrated in a mouse model that Cu can modulate tumor growth and chronic exposure accelerates tumor cell growth. The study was conducted in mice; however, results can be fully extrapolated to humans since Cu metabolism and action are similar in both. Decreased levels of Cu (input or chelation) decrease tumor proliferation: Cu regulates cancer cell proliferation and oxidative phosphorylation. The authors clarify that Cu is not a carcinogen, but stimulates proliferation of transformed-neoplastic cells. A recent study established a relationship between multivitamins and prostate cancer. Another study found an increased risk of advanced prostate cancer in patients taking vitamin supplements more than seven times per week and this

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Fig. 2 – Image of T1-weighted MRI Brain, sagittal section. The red arrow points to the thalamic infarct region.

Thanks

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association was particularly strong in patients with a family history or men taking supplements including Cu in their formulation. Cu is included in the AREDS formula because zinc competes for its absorption. Some studies have established maximum tolerable zinc doses at 40 mg, and recent findings confirm that oral zinc doses above 25 mg are not absorbed. AREDS formula was changed in smokers because beta carotene induced lung cancer; is this not also applicable to patients with present or past neoplastic processes (i.e. using a new AREDS formulation with lower zinc and copper concentrations)?

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