Letters to the Editor 1293

Intakes of copper in nutrition surveys are falsely high

Dear Sir:

Bailey et al (1) examined mineral intakes of Americans from diets and from supplements and concluded that supplement users had higher intakes from food than did nonusers. For copper, their intake estimates probably are too high and their estimates of inadequate intakes too low.

When copper intakes are estimated from nutrition surveys using food-composition tables, the results usually are too high. Eight peer-reviewed articles (see reference 2) contained comparisons of calculated intakes and intakes measured by chemical analyses. Seven articles showed that calculated excess copper ranged from 11% to 183%. One article found that calculated copper was 20% too low. The mean excess for 8 articles was 77% (2, 3). Algebraic correction for the calculated excess of the authors’ daily copper intakes (nonusers) indicates 0.90 mg for men and 0.68 for women. These amounts are similar to the Recommended Dietary Allowance and the Estimated Average Requirement (EAR), respectively. Thus, half of the women and a substantial number of men should be deficient, because the EAR “is the level of intake for which risk of inadequacy would be 50 percent” (4). Of course, no one knows who is deficient without measurements of nutriture (see below).

Cupric oxide is included in supplements with many ingredients because it has a high concentration of copper, not because of demonstrated efficacy (5). It is no longer used in animal nutrition because it poorly metabolized (6). Thus, supplement users are unlikely to gain much useful copper, and the authors’ estimates of daily intakes (>3 mg) probably are far too high.

The authors are not the first to find seemingly ample amounts of dietary copper in NHANES or in other nutrition surveys (7). The results contrast with a collection (3) of >60 medical articles with data on ~2500 people with low copper nutriture according to the Oxford Textbook of Medicine (8): low copper concentrations in tissues and compromised metabolic pathways. For example, Wester (9) reported decreased copper concentrations in presumably normal myocardia of infarcted hearts nearly 5 decades ago.

Most recently, Koc et al (10) found decreased activity of a copper-dependent enzyme, (extracellular) superoxide dismutase, in plasma of men and women with coronary artery ectasia. These are examples of cardiovascular diseases associated with low copper nutriture. Similar articles on diseases of the central nervous and musculoskeletal systems have been collected (3). Other enzymes and tissues also are affected.

The metabolic data (3) are more consistent with the conclusion that at least one-fourth of adults consume less than the copper EAR published for the United States and Canada than are those of the authors: 14% and 10% of men and women, respectively (nonusers), consume less than the EAR. Patients resembling those with data described in reference 3 should be evaluated and supplemented with copper to determine whether indexes of nutriture improve.

The author had no conflicts of interest to disclose.

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Reply to LM Klevay

Dear Sir:

Klevay commented on the interpretation of the copper intakes in our recent article (1). The values for copper in food-composition and dietary supplement tables are not corrected for absorption. However, the food-composition tables—the USDA National Nutrient Database for Standard Reference (SR) (http://www.ars.usda.gov) used by the NHANES and other surveys—contain many foods that have been chemically analyzed. Copper is analyzed by inductively coupled plasma spectrometry, and analytic samples are accompanied by quality-control materials. Representative food samples are procured at retail outlets around the United States by using a nationwide sampling plan. In the past 15 y, >1600 food items have been sampled and analyzed. These results were used to update and expand the nutrient data in the SR and its related subset used for the NHANES. Currently, >60% of the copper data in the SR is from analytic sources.

In addition, multivitamin/mineral (MVM) dietary supplements have been analyzed for their copper content as part of the Dietary Supplement Ingredient Database (http://dsid.usda.nih.gov), a collaborative project with the NIH Office of Dietary Supplements and the USDA Agricultural Research Service. MVM supplements that are representative of the US market were identified, sampled, and chemically analyzed by inductively coupled plasma spectrometry, and the results were compared with labeled amounts. Supplements were analyzed with quality-control materials, including Standard Reference Materials to ensure the accuracy and precision of results. The analytic copper amounts in the initial studies of adult and children’s MVMs averaged 5–10% above labeled amounts. Sixty-eight percent of 188 adult MVMs purchased in 2011 contained copper, with 12 different sources of copper listed on the labels. The most common sources were cupric sulfate (33%), cupric oxide (28%), and copper gluconate (19%).

We agree that in the assessment of nutritional status, information on dietary intakes is only one of several possible markers to examine, and this is why we were careful to not classify people as deficient or sufficient in any mineral. Rather, we simply reported the proportion of US adults with copper intakes below the Estimated Average Requirement (EAR). The EAR is for use with population-level assessment (2), not the Recommended Dietary Allowance.

None of the authors had any conflicts of interest to disclose.

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Conclusions of the Optimal Lean Diet Study go beyond the data

Dear Sir:

We applaud Roussell et al (1) for performing a difficult controlled-feeding study and their high compliance rate. However, we are concerned that their conclusion, “The results of the BOLD Study provide convincing evidence that lean beef can be included in a heart-healthy diet that meets current dietary recommendations and reduces CVD risk,” goes far beyond the study data.

Briefly, Roussell et al (1) showed that in 36 participants with elevated LDL cholesterol, diets with different amounts of lean red meat had similar beneficial effects on LDL cholesterol and similar adverse effects on HDL cholesterol. Their study did not account for potential effects mediated by other pathways or over years rather than weeks.

The relations between red meat intake and diabetes (2), coronary heart disease (3), stroke (4), and mortality (5) have been examined in multiple long-term prospective studies. All have concluded that higher risk is associated with higher red meat intake. Although these studies have not distinguished between lean and nonlean red meat, they have noted that the fat content of red meat is unlikely to be solely responsible for its...