

Vitamin/Trace Mineral Supplements for the Elderly¹

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ABSTRACT

The fraction of population that is elderly has been increasing, as has the consumption of vitamin/trace mineral supplements, which is now a multibillion dollar industry. Yet the rationale for such supplement intake by the majority may be questioned. Some of the current recommendations for micronutrient intake by the elderly are extrapolations from recommendations made for younger adults, whereas other recommendations are based on measurements of biochemical indices not proven to reflect a deficient level in the elderly. Suggestions that the elderly need more than the recommended daily allowances largely rest on the assumption that they should have biochemical indices similar to younger adults despite decreased energy intake with decreased physical and metabolic activities of the elderly. Although some individuals require supplementation because of problems with intake, absorption, or metabolism, there is little or no proof that boosting micronutrient intake above what can be achieved in well-balanced diets, some of which already contain fortified foods, will lead to a healthier outcome for most elderly individuals. There is not only the potential for unnecessary and occasionally harmful excess administered to some, but there is a cost that now runs in the billions of dollars and adds to the costs of covering multiple chronic disease conditions. Hence, some caution should be exercised in public health promulgations concerning routine use of supplements for those in this age group (>65 y of age) and of both sexes until more research establishes clear connections between the need for micronutrients and nutrient-related health in the elderly. *Adv. Nutr.* 3: 822–824, 2012.

Introduction

The population that is considered elderly (>65 y of age) is increasing in most developed countries as a result of “successful aging” and declining birth rates (1). A review of the economic analysis of nutrition interventions, such as was published in *Nutrition Reviews*, on chronic disease prevention (2) offers some guidelines that may be brought to bear on the use of supplements in the elderly. In earlier considerations of the daily recommended dietary allowances, the oldest age category was older than 51 y; however, ranges of 51 to 70 y and also older than 70 y are now considered. Although the literature now provides some studies of older individuals, many of the recommendations for such elderly were and still are based on extrapolations from younger persons. Often the biochemical indices that have been adjudicated as indicating insufficient intake or use of a nutrient for younger adults are assumed to also indicate insufficiency in an elderly population. This is despite the absence of any clinical signs of pathology and the possibility that there may be lowered requirements of certain micronutrients as

there is for energy intake as a result of aging. These arguments do not abrogate the possibility that some elderly individuals may have such a degree of appetite suppression that supplementation is necessary; however, often greater concern for the gustatory quality of meals served, especially in homes for the elderly and hospitals, may alleviate some of this problem.

Current status of knowledge

Clearly there are some physiologic and metabolic factors that alter physiologic and metabolic needs in the elderly (1). Accompanying reduction of activity and total energy expenditure there is a decreased need for energy intake, although an increase in nutrient density is deemed desirable. Even though energy expenditures decrease in the elderly, there is no indication that requirements for thiamin, riboflavin, and niacin are different than in other adults. Some arguments have been made for increasing the intake of vitamin B-6 where there may be some alteration in metabolism rather than absorption (3). Increased incidence of atrophic gastritis and in some cases an increase in homocysteine in the elderly argue for some increase in vitamin B-12 and folate. Because absorption and metabolism of

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vitamin C do not seem to change with aging, there is no evidence that indicates an increased need in the nonsmoking elderly. There is also no evidence that either absorption or utilization of vitamin E changes with age (4). Clearly there is a decrease in skin synthesis of vitamin D and, after its metabolism in the liver to 25-hydroxycholecalciferol, the further conversion to the hormonally active $1\alpha,25$ -dihydroxycholecalciferol is impaired. So too is the gut response to the hormone, which leads to a specific protein-mediated uptake of calcium. Hence, an augmented need for vitamin D is expected in some elderly. For postmenopausal women, a daily intake of 800 to 1000 IU of vitamin D was found in 2012 by Gallagher et al. (5) to support recommendations made in 2010 by The North American Menopause Society (6). In discussion of these findings, McClung (7) concludes with the statement that "Enthusiasm among many practitioners for use of and the potential benefits of high doses of vitamin D supplements has outstripped the available evidence supporting that usefulness. Our recommendations to our patients must be based on solid evidence, not on hopes or hypotheses." Even more broadly as concerns older women, it has been reported that the use of dietary supplements of commonly used vitamins and minerals is not associated with reduced mortality, but rather many supplements were associated with increased risk of total mortality compared with corresponding nonuse (8). As for the essential trace minerals, cessation of the menstrual period in women leads to some decrease in the iron requirement; however, there is still need for some iron that functions in essential nonheme roles as well as for zinc and other nutrients that may help offset the decrease in immunocompetence with aging. Evidence is insufficient to support an age effect on copper requirements (9). Dietary intakes of chromium are often less than estimated for the adequate intake suggested for all adults; however, there is insufficient evidence to suggest a pathophysiologic consequence of decreases in levels of the mineral in serum, hair, and sweat with aging (10). Serum selenium concentrations in some elderly have been found lower than normal, but no pathologic conditions related to selenium insufficiency have been reported in the United States (11,12). Toxicity becomes an observed danger with excess of some micronutrients such as some of the fat-soluble vitamins and most trace elements. The tolerable upper intake levels are not well established for many of the micronutrients. Cost is an important consideration. Each year there is increasing cost for age-related multiple chronic disease conditions such as diabetes, heart disease, chronic respiratory conditions, and cancer (13,14). With regard to heart disease, the dubious use of vitamin-mineral supplements has already been addressed (15). Micronutrient supplementation for cancer patients is also not recommended at present, as it has been reported that although benefit may accrue in those with low nutrient intake, cancer is actually promoted in those with higher nutrient status given supplements or to achieve pharmacologic exposures (16).

Conclusion

From all of the above, it is apparent that changes in requirements for the elderly do not suggest massive supplement use

covering most micronutrients. Rather, generally minor dietary shifts can accommodate most needs, with supplements included only where there is evidence of serious limitation of intake. Given that a large proportion, perhaps half or more of the elderly in the United States use vitamin/trace element supplements (17) and that such use now totals in the billions of dollars (18), it seems reasonable to ask whether the cost-benefit ratio is a worthy public health investment. In 1 review in the medical literature (19), it was suggested that all adults should take a multivitamin and mineral supplement, and the elderly should take 2. It has recently been stated that adequate intake of vitamins in the elderly is still a concern and that where dietary manipulation is difficult, fortified foods and dietary supplements can be a pragmatic solution (20). However, there are arguments that may temper any large and all-encompassing suggestions (18). There is little or no proof that boosting micronutrient intake above what can be achieved in a well-balanced diet will lead to a healthier life that can be extended beyond the genetic set point we inherit. It appears that the exuberance of some should be tempered by such evidence-based findings as are currently available. As stated in a recent report (16), "The hypothesis that groups with low nutrient status may benefit from supplementation has yet to be formally tested." These are clinically certifiable problems that must be addressed. This can be contrasted with the practice of taking vitamin/trace element supplements without proven need.

Recommendations

It would be helpful for all health professionals who communicate their views on micronutrient needs for any age group to be familiar with such knowledge as detailed in books on vitamins (21), minerals (22), and the interactions of these micronutrients with regard to human nutrition (23,24). Additionally, further research focused on the nutrient needs of the elderly, a growing proportion of our population, should be continued to add depth and certainty to our knowledge. Well-informed professionals might then offer advice to a public that can be reinforced with the certainty that more is not always better.

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