Osteoporosis treatment and the calcium requirement

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In recent years there has been an expanding body of evidence from randomized, controlled trials indicating that increasing calcium intake reduces bone loss and risk of fracture in postmenopausal women. These findings are reflected in the recent recommendation by the Institute of Medicine of the National Academy of Sciences, that healthy women > 50 y old consume 1200 mg Ca/d, rather than the 800 mg/d that the institute had recommended earlier (1). Many women in the United States are being treated for osteoporosis, however, and the relevance of this recommendation to these women merits consideration.

According to the World Health Organization (2), 21% of postmenopausal white women in the United States are osteoporotic and an additional 38% are osteopenic at the femoral neck (3). As the elderly segment of the US population expands rapidly, so will the number of fractures. Schneider and Guralnik (4) have projected that the number of hip fractures in the United States will triple between 1990 and 2040. It is therefore important to consider whether calcium intake influences the effectiveness of estrogen and other drugs used to prevent and treat osteoporosis. Or, to cast the issue from a nutritional perspective, to ask, does use of estrogen and other antiresorptive agents alter the calcium intake requirement?

Several organizations have grappled with this issue. In 1994, the National Institutes of Health Consensus Development Conference on Calcium concluded that estrogen use lowers the calcium requirement (5). Accordingly, they recommended an intake of 1000 mg Ca/d for postmenopausal women receiving hormone replacement therapy and 1500 mg Ca/d for women not receiving hormone replacement therapy. More recently, the Institute of Medicine (1) reported that the evidence did not support different calcium recommendations for postmenopausal women on the basis of estrogen use.

Nieves et al (6) addressed this important issue in their careful review of 31 estrogen intervention trials. They noted substantially larger mean increases in bone mineral density of the spine, hip, and forearm in the 20 trials that used calcium with hormone replacement therapy than in the 11 trials that used hormone replacement therapy alone. A similar difference with respect to lumbar spine bone mineral density changes was noted for calcitonin, (with and without calcium,) although the amount of evidence available was considerably less (six calcitonin intervention trials with and one trial without added calcium). The apparent added benefit from calcium may seem surprising, because one might expect that the reduction in remodeling space induced by estrogen and other antiresorptive agents would be so dominant as to obscure a weaker antiresorptive effect of calcium.

Nieves et al’s findings raise doubt that calcium affects bone solely by lowering the remodeling rate.

A relevant consideration that was examined by Nieves et al is the dietary calcium intake of the women who participated in the estrogen and calcitonin trials. Added benefit from calcium was noted in women who increased their intake from a mean value of 563 mg/d to ≈1200 mg/d. In this regard, it is likely that the meta-analysis results can be generalized, given that a calcium intake of 563 mg/d is close to the median intake for postmenopausal women in the United States. Finally, Nieves et al’s findings agree with the results of an earlier randomized open trial that directly assessed the effects of estrogen replacement, with and without added calcium, on rates of bone loss in Chinese women with low initial calcium intakes (7).

In conclusion, the meta-analysis of Nieves et al supports the position that calcium is an important component of a regimen that includes antiresorptive therapy for the prevention and treatment of osteoporosis. It also supports the notion that the calcium intake requirement of women treated with estrogen may not be lower than that of average postmenopausal women. Moreover, this and other studies do not exclude the possibility that women receiving antiresorptive treatments may benefit from an even higher calcium intake than average women. Randomized trials are the appropriate next step to directly assess the independent and combined effects of calcium and antiresorptive drugs on the skeleton and to determine the optimal intake of calcium in this setting.

REFERENCES


1 From the Jean Mayer US Department of Agriculture Human Nutrition Research Center on Aging, Tufts University, Boston.
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