Dietary Silicon Intake Is Positively Associated With Bone Mineral Density in Men and Premenopausal Women of the Framingham Offspring Cohort

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Abstract

The role of dietary silicon in bone health in humans is not known. In a cross-sectional, population-based study (2847 participants), associations between dietary silicon intake and BMD were investigated. Dietary silicon correlated positively and significantly with BMD at all hip sites in men and premenopausal women, but not in postmenopausal women, suggesting that increased silicon intake is associated with increased cortical BMD in these populations.

Introduction: Osteoporosis is a burgeoning health and economic issue. Agents that promote bone formation are widely sought. Animal and cellular data suggest that the orthosilicate anion (i.e., dietary silicon) is involved in bone formation. The intake of silicon (Si, ~30 mg/day) is among the highest for trace elements in humans, but its contribution to bone health is not known.

Materials and Methods: In a cross-sectional, population-based study, we examined the association between silicon intake and bone mineral density (BMD) in 1251 men and 1596 pre- and postmenopausal women in the Framingham Offspring cohort (age, 30–87 years) at four hip sites and lumbar spine, adjusting for all potential confounding factors known to influence BMD and nutrient intake.

Results: Silicon intake correlated positively with adjusted BMD at four hip sites in men and premenopausal women, but not in postmenopausal women. No significant association was observed at the lumbar spine in any group. Categorical analysis by Si intake, or energy-adjusted Si intake, supported these findings, and showed large differences in BMD (up to 10%) between the highest (>40 mg Si/day) and lowest (<14 mg Si/day) quintiles of silicon intake. A significant association at the lumbar spine in men was also observed. Further analyses indicated that some of the effects seen for moderate consumption of alcoholic beverages on BMD might be attributed to Si intake.

Conclusions: These findings suggest that higher dietary silicon intake in men and younger women may have salutary effects on skeletal health, especially cortical bone health, that has not been previously recognized. Confirmation of these results is being sought in a longitudinal study and by assessment of the influence of silicon intake on bone markers in this cohort.