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# Effects of dietary calcium compared with calcium supplements on estrogen metabolism and bone mineral density<sup>1, 2, 3, 4</sup>

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**Background:** High calcium intake has been associated with both high bone mineral density (BMD) and high urinary estrogen metabolites. However, the role of dietary calcium and calcium supplements on estrogen metabolism and BMD remains unknown.

**Objective:** The objective was to investigate the importance of the source of calcium intake on estrogen metabolism and BMD.

**Design:** The average total daily calcium intake from supplements and diet, urinary estrogen metabolites, and spine and proximal femur BMD were studied in 168 healthy postmenopausal white women.

**Results:** Women who obtained calcium primarily from the diet or from both the diet and supplements had significantly ( $P = 0.03$ ) lower ratios of nonestrogenic to estrogenic metabolites (2-hydroxyestrone/16 $\alpha$ -hydroxyestrone) than did those who obtained calcium primarily from supplements. Adjusted BMD z scores were significantly greater in the subjects who obtained calcium primarily from the diet or from both the diet and supplements than in those who obtained calcium primarily from calcium supplements at the spine ( $P = 0.012$ ), femoral neck ( $P = 0.02$ ), total femur ( $P = 0.003$ ), and intertrochanter ( $P = 0.005$ ). This difference was evident especially in those who obtained calcium primarily from the diet, whose total calcium intake was lower than that in those who obtained calcium primarily from supplements.

**Conclusion:** Calcium from dietary sources is associated with a shift in estrogen metabolism toward the active 16 $\alpha$ -hydroxyl metabolic pathway and with greater BMD and thus may produce more favorable effects in bone health in postmenopausal women than will calcium from supplements.

**Key Words:** Calcium • estrogen metabolism • bone mineral density • osteoporosis

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