

Postprandial effects of almond consumption on human osteoclast precursors—an ex vivo study.

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Abstract:

Consumption of almonds has been associated with increased bone mineral density, but the direct effects of almonds on bone cells are not known. We determined whether serum obtained following the consumption of a meal containing 60 g of almonds affects human osteoclast formation, function, and gene expression in vitro. Human osteoclast precursors were cultured in medium containing 10% serum obtained from 14 healthy subjects at baseline and 4 hours following the consumption of 3 test meals containing almonds, potatoes, and rice and balanced for macronutrient composition. Osteoclast formation was determined by the number of tartrate-resistant acid phosphatase (TRAP)⁺ multinucleated cells, and osteoclast function was assessed by measuring TRAP activity in the culture medium and calcium released from OsteoAssay (Lonza Walkersville, Walkersville, MD, USA) plates. The expression of cathepsin K, receptor activator of nuclear factor kB, and matrix metalloproteinase–9 genes was measured by real-time reverse transcriptase–polymerase chain reaction. Compared with serum obtained at baseline, serum obtained 4 hours following the consumption of the almond meal reduced osteoclast formation by approximately 20%, TRAP activity by approximately 15%, calcium release by approximately 65%, and the expression of cathepsin K, receptor activator of nuclear factor kB, and matrix metalloproteinase–9 by 13% to 23%. No effects were observed with serum obtained from the other test meals. Serum obtained 4 hours following the consumption of an almond meal inhibits osteoclast formation, function, and gene expression in cultured human osteoclast precursors, and provides evidence for a positive effect of almonds on bone health.