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BONE

Vitamin E: friend or foe to bone?

Vitamin D is undoubtedly important in bone mineralization and health, but the role of its fellow fat-soluble, nutritionists' favorite, vitamin E, remains controversial. Fujita *et al.* now report in *Nature Medicine* that vitamin E, in contrast to vitamin D, encourages bone resorption rather than mineralization, and that it does so by stimulating osteoclast maturation.

To investigate the role of vitamin E in bone remodeling, Fujita and colleagues studied a genetic model of vitamin E deficiency–*Ttpa*$^{-/-}$ mice. Vitamin E comprises a group of compounds, including tocotrienols and the more predominant tocopherols. *Ttpa*$^{-/-}$ mice, which lack α-tocopherol (α-TCP) transfer protein, are unable to transfer α-TCP into lipoproteins.

The mass of vertebrae and long bones was higher in *Ttpa*$^{-/-}$ mice than in wild-type litter mates—the result of reduced levels of bone resorption (lower levels of bone resorption markers and reduced osteoclast surface area) with normal levels of bone formation. Cell culture experiments using osteoclasts derived from wild-type bone marrow cells showed that α-TCP increased bone resorption by stimulating the late stages of osteoclast maturation, a process known as fusion.

The authors also studied the effect of α-TCP dietary supplementation, using amounts deemed equivalent to levels in currently available vitamin E supplements. In wild-type mice and rats, an α-TCP-supplemented diet resulted in a 20% decrease in bone mass compared with those on a normal diet, due to increased bone resorption and osteoclast size.

"The most important point will be if our findings are also true in humans", explains Shu Takeda, the corresponding author of this paper. "We are currently studying the relationship between serum vitamin E levels and BMD in humans".

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Original article Fujita, K. *et al.* Vitamin E decreases bone mass by stimulating osteoclast fusion. *Nat. Med.* doi:10.1038/nm.2659