Vitamin D: A double-edged sword in the fight against osteoporosis?

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Vitamin D is renowned for its role in creating strong bones and is a key regulator of serum calcium levels. Calcium is primarily obtained through diet and absorbed through the intestine and into the blood stream. In addition to building bone, calcium is required for a variety of important physiological processes. Vitamin D, which is detected by receptors in bone and intestinal cells, regulates the level of calcium in the blood stream and determines how much should be stored in the skeleton. Several recent clinical trials have examined the effects of vitamin D supplements on the prevention of bone fractures in the elderly; however, the results of these trials have not offered a consensus on the efficacy of these supplements.

In this month's issue of JCI, Dr. Geert Carmeliet and colleagues at the University of Leuven in Leuven, Belgium, investigated how vitamin D affects the skeleton when serum calcium levels are depleted. Using mice that lack the intestinal vitamin D receptor, the researchers showed that the mice still had normal serum calcium levels even when given a low-calcium diet. Additional experiments demonstrated that vitamin D stimulated bone cells to produce factors that removed calcium from bone in a process known as bone resorption in order to maintain normal serum calcium levels. Thus, while vitamin D is important for maintaining serum calcium levels, it can also promote bone density loss.

In an accompanying article, Dr. Cathleen Colón-Emeric and Dr. Kenneth Lyles of Duke University Medical Center in Durham, North Carolina, discuss the clinical implications of this investigation as well as how these

findings may explain clinical trial results where vitamin D supplements failed to prevent fractures in elderly patients and, in some cases, were correlated with increased fracture rates.

More information: Normocalcemia is maintained in mice under conditions of calcium malabsorption by vitamin D–induced inhibition of bone mineralization, *Journal of Clinical Investigation* (2012).

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