



THE UNIVERSITY OF ARIZONA

## Andrew Weil Center for Integrative Medicine

### True or False: Vitamin D Builds Healthy Bones?

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The world of vitamin D prescribing just became a bit more confusing. A clinical trial was recently published in JAMA about the effect of vitamin D supplementation on bone density in older adults.<sup>1</sup> The results of this article have been widely reported leading many to believe that vitamin D is not the supplement we hoped it to be for bone health. The reason lies in the conclusions of the investigators, “These findings do not support a benefit of high-dose vitamin D supplementation for bone health.” Is this wide-reaching conclusion justified?

The study randomized 311 healthy Canadian adults aged 55 to 70 years of age who had healthy bone density and who were not deficient in vitamin D to start. Participants took liquid vitamin D oral drops, 400iu, 4000iu or 10,000iu daily for three years.

The results of this study were interesting. Participants’ vitamin D levels increased in accordance with the dose of vitamin D that they took. However, despite the dose-dependent increases in serum vitamin D, there were greater losses in bone density in the higher dose groups!

So, what is going on here? The investigators surmised that high-dose vitamin D without additional calcium supplementation results in the release of calcium from bone. This has been observed in other studies. The investigators note that their results are consistent with those of a 2018 meta-analysis of 81 randomized clinical trials that concluded that oral vitamin D supplementation did not lead to reduced fractures, falls or increases in bone density.<sup>2</sup>

But, don’t throw out your vitamin D just yet. Older individuals who are deficient in vitamin D are at increased risk for fractures and falls.<sup>3,4</sup> Importantly, there is ample clinical evidence that supports the use of supplemental vitamin D when taken together with calcium to lower fracture risk in these individuals.<sup>5,6</sup> For instance, a 2007 meta-analysis of 6 randomized controlled trials representing 45,509 patients, found that vitamin D supplementation (700-800iu) with calcium supplementation (1000 – 1200mg daily) resulted in an 18% lower risk of hip fracture.<sup>7</sup> And, keep in mind that vitamin D supplementation has other benefits. Notably, a recent systematic review and meta-analysis which included 52 trials representing 75,454 participants found that vitamin D supplementation (at varying levels) was associated with a 16% reduced risk of death from cancer.<sup>8</sup>

The bottom line? Vitamin D supplementation, by itself, is unlikely to improve bone density and to reduce the risk of osteoporotic fractures in older individuals who have sufficient vitamin D levels. The body of evidence supports the use of vitamin D with calcium supplementation in older individuals who have insufficient vitamin D serum levels. More is not necessarily better with 800iu being a sufficient dose in many trials.

This article is in response to this [New York Times article](#).



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- <sup>1</sup> Burt LA, Billington EO, Rose MS, et al. Effect of High-Dose Vitamin D Supplementation on Volumetric Bone Density and Bone Strength: A Randomized Clinical Trial. *JAMA*. 2019;322(8):736-45.
- <sup>2</sup> Bolland MJ, Grey A, Avenell A. Effectsofvitamin D supplementation on musculoskeletal health. *Lancet Diabetes Endocrinol*. 2018;6(11):847-858.
- <sup>3</sup> Snijder, MB, Van Schoor, NM, Pluijm, SM, et al. Vitamin D status in relation to one-year risk of recurrent falling in older men and women. *Journal of Clinical Endocrinology and Metabolism*. 2006;91:2980–2985.
- <sup>4</sup> Van Schoor, NM, Visser, M, Pluijm, SM, et al. Vitamin D deficiency as a risk factor for osteoporotic fractures. *Bone*. 2008;42:260–266.
- <sup>5</sup> Chapuy, MC, Arlot, ME, Duboeuf, F, et al. Vitamin D3 and calcium to prevent hip fractures in the elderly women. *New England Journal of Medicine*. 1992; 327:1637–1642.
- <sup>6</sup> Chapuy, MC, Pamphile, R, Paris, E, et al. Combined calcium and vitamin D3 supplementation in elderly women: confirmation of reversal of secondary hyperparathyroidism and hip fracture risk: the Decalyos II study. *Osteoporosis International*. 2002;13:257–264.
- <sup>7</sup> Boonen, S, Lips, P, Bouillon, R, et al. Need for additional calcium to reduce the risk of hip fracture with vitamin D supplementation: Evidence from a comparative meta-analysis of randomized controlled trials. *Journal of Clinical Endocrinology and Metabolism*. 2007;92:1415–1423.
- <sup>8</sup> Zhang Y, Fang F, Tang J, et al. Association between vitamin D supplementation and mortality: systematic review and meta-analysis. *BMJ*. 2019;366:14673.