Published: October 5, 2022 **Biote Medical Journal Volume 1: Issue 2**

Document ID: 972.1.2

Vitamin D Monitoring and Supplementation Are Unnecessary: SAY WHAT?!

Cory Rice, DO; Ross W. McQuivey, MD

Vitamin D deficiency is widely recognized as a worldwide epidemic and public health concern[i]. More than 60% of post-menopausal women have inadequate Vitamin D levels as measured by serum levels of 25(OH)D. The Institute of Medicine (IOM) defines vitamin D deficiency as serum levels of 25(OH)D less than 50 nmol/l (or 30 ng/ml). Throughout the years there have been conflicting studies as it relates to Vitamin D's impact on bone health as measured by bone mineral density. The recent VITAL trial in the NEJM published in July of this year being the most recent. The study concluded there was no benefit to Vitamin D supplementation for "healthy midlife and older adults" in the prevention of fractures[ii]. These conclusions are nothing new. Biote has presented data at certification training from JAMA in 2019 that draws similar misguided conclusions (though higher Vitamin D dosages were used)[iii]. In that study it was concluded that high dose Vitamin D (10,000U) did not change bone mineral density.

Both the recent NEJM study and the JAMA study have similar limitations. In the VITAL trial, the researchers specifically excluded patients with a known Vitamin D deficiency. If Vitamin D levels are <u>not</u> evaluated, how would deficiencies be identified in patients with a true clinical need? In addition, the dose of D3 supplementation used in the NEJM study was inadequate—only 2000 IU's of D3—which is too low for most patients. As you know, Biote advocates for Vitamin D serum levels in the 50-80 nmol/l range. The VITAL study targeted levels around 40.

Thirdly, and maybe most importantly, as in the JAMA study, the NEJM study did not include the addition of Vitamin K2. As Biote explains in certification training, K2 is critical to bone mineral density and overall bone health and its mechanism of action has been well documented. Vitamin K2 plays a direct role in transporting calcium from circulation into bone tissue by activating two key calcium transport proteins in the bloodstream: matrix Gla protein (MGP), which transports calcium from circulation into bone, and osteocalcin, which reduces calcification of arteries and plays a significant role in bone development[iv,v]. Furthermore, studies showing a combination of Vitamin D and calcium supplementation have shown more favorable results as it relates to bone mineral density. Strong clinical evidence has been found using Vitamin D supplements with calcium supplements to reduce hip fracture and non-vertebral fractures[vi]. Calcium absorption in the intestine is dramatically increased with optimal serum levels of Vitamin D[vii]. As Biote teaches in training, calcium supplementation is not as necessary when Vitamin D levels are adequate, as optimized levels enhance the body's absorption of calcium from the diet through the gut. The K2 then takes this calcium and removes it from the arteries and puts it back into the bone through the above-mentioned mechanism.

Finally, back to the recent NEJM article, the identity of the D3 utilized in the study was not made clear, thus one cannot be certain of the quality or consistency of the supplement used. Sourcing, quality, and

consistency of supplements is important given the lack of 3rd party oversight and the extreme variations in quality and consistency among different manufacturers. Given the above limitations, I would caution any healthcare provider or insurance provider to make the ill-conceived conclusion that monitoring Vitamin D3 levels are unnecessary based on these studies. Also very importantly, the recent VITAL trial intentionally focused on bone health only, but there are a myriad of health benefits Vitamin D confers to the human body outside of bone that are well documented[viii].

---

[i] Brincat M, et al., The role of vitamin D in osteoporosis. *Maturitas*. 2015 Mar;80(3):329-32.

[ii] LeBoff MS,et al.,. Supplemental Vitamin D and Incident Fractures in Midlife and Older Adults. *N Engl J Med*. 2022 Jul 28;387(4):299-309.

[iii] Burt LA, et al.,. Effect of High-Dose Vitamin D Supplementation on Volumetric Bone Density and Bone Strength: A Randomized Clinical Trial. *JAMA*. 2019 Aug 27;322(8):736-745.

[iv] Booth SL, Centi A, Smith SR, Gundberg C. The role of osteocalcin in human glucose metabolism: marker or mediator? *Nat Rev Endocrinol*. 2013 Jan;9(1):43-55.

[v] Cranenburg EC, et al., The circulating inactive form of matrix Gla Protein (ucMGP) as a biomarker for cardiovascular calcification. *J Vasc Res*. 2008;45(5):427-36.

[vi] Avenell A, Mak JC, O'Connell D. Vitamin D and vitamin D analogues for preventing fractures in post-menopausal women and older men. Cochrane Database Syst Rev. 2014 Apr 14;2014(4).

[vii] Holick MF. Vitamin D deficiency. *N Engl J Med*. 2007 Jul 19;357(3):266-81.

[viii] Hossein-nezhad A, Holick MF. Vitamin D for health: a global perspective. *Mayo Clin Proc*. 2013 Jul;88(7):720-55.