

Editorial

Vitamin D and Skeletal Muscle Loss

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The importance of vitamin D on muscle mass and bone health has been much debated. Vitamin D has beneficial effect on sarcopenia and frailty especially in patients with kidney disease, cancers, chronic obstructive pulmonary disease and elderly people [1-3].

Serum concentrations of vitamin D are measured in the form of 25-hydroxyvitamin D 25 (OHD), but may suffer change with advancing age, sun exposure, ethnicity, body mass index and calcium and phosphorus metabolism [4]. In addition, studies have shown that vitamin D deficiency (values below 20-30 nmol/L of 25(OHD) is commonly linked with systemic inflammation, sarcopenia, fatigue, impaired bone health and poor quality of life [1,2,5]. In healthy women it was found that deficiency of 25OHD is accompanying with 24% more intramuscular fat than with higher concentrations of 25OHD [6]. One of the consequences, probably due to intramuscular lipid accumulation, is insulin resistance [7].

In cancer, *in vivo* and *in vitro* studies that administrated vitamin D analogues have demonstrated anti-proliferative effects in cancer cells, as well as reduction in tumor cells invasiveness and migration [8,9].

Regarding muscle mass and strength, it is known that vitamin D participates in the modulation of muscle growth and frailty (Figure 1). Indeed, studies have found that the skeletal muscle cells exhibit the vitamin D receptor, which is able to generate molecular and physiological effects on myocytes. With respect to mechanisms of action, it is observed that after vitamin D intake an increase in Insulin Growth Factor expression (IGF) occurs; alongside, an increase in calcium metabolism through calcium-binding protein (calbindin-D28k)

and an increase in calcium influx in myocytes by activation of MAP kinase and phospholipase C, promoting muscle contraction and increased proliferation and differentiation of type 2 muscle fibers is also observed [10-12].

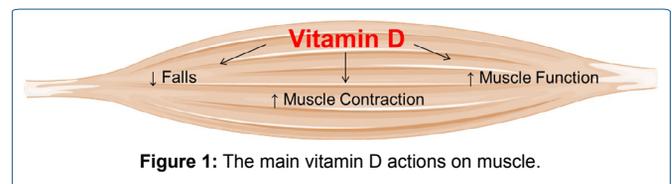


Figure 1: The main vitamin D actions on muscle.

Several studies, have shown that supplementation with vitamin D3 analogs improves sarcopenia, frailty, bone health and gait speed. Supplementation at a dose of 700-1000 IU per day appears to be effective in increasing the muscle mass and strength and attenuate the falls number in the elderly subjects [13,14] (Figure 1). However, high-dose of supplementation with vitamin D (24000 IU plus calcifediol or 60000 IU per day) is associated with higher 25OHD concentrations and more falls in the elderly was also found [15].

Even though the control of 25OHD concentrations is a good strategy to monitor vitamin D deficiency, excessive supplementation is not beneficial to human health. Furthermore, future nutritional and environmental strategies, such as the control and promotion of vitamin D-rich food sources and controlled sun exposure should be taken to prevent the appearance of more fragile and sarcopenic elderly.

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