Vitamin D and Bone Health in the Elderly
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Inadequate intakes of vitamin D have been associated with reduced calcium absorption, higher bone-remodeling rates, increased bone loss, and reduced secondary bone mineralization. More recently, vitamin D has been linked to muscle function and risk of falling. Muscle tissue contains vitamin D receptors that, when activated, promote protein synthesis and thus muscle cell growth. In a random sample of men and women in the U.S., age 60 and older (NHANES III), higher blood levels of 25-hydroxyvitamin D [25(OH)D] were associated with faster speeds on sit-to-stand and walking tests (1). Improvements were observed as levels rose into and from the lower to the upper end of the reference range. A recent meta-analysis of randomized, controlled vitamin D intervention studies revealed that supplementation with vitamin D, with or without calcium, lowered risk of falling by 22% (2). In the elderly, falls are a major cause of injury, including fractures. A mean serum 25(OH)D level of at least 75 to 80 nmol/L is needed for optimal bone strength, muscle performance, and maximum reduction in risk of falling (2).

A meta-analysis of randomized, controlled supplement trials indicated that vitamin D with or without calcium lowers risk of hip and all non-vertebral fractures in older adults by 26 and 23%, respectively (3). Two more recent trials found no reduction in fracture rates with use of 800 IU/d of vitamin D$_3$, perhaps because of extensive non-persistence with the supplements. Most of the participants in the fracture prevention trials were older Caucasians. A recent study in African American women showed no impact of 800 or 2000 IU/d of vitamin D$_3$ on rates of bone loss (4). The effect of vitamin D on fracture rates in non-Caucasian populations is unknown.

The National Academy of Sciences recommends 400 IU/d of vitamin D for men and women age 51-70 yrs and 600 IU/d for those over age 70, together with 1,200 mg/d of calcium. There is increasing recognition, however, that 400 to 600 IU/d of vitamin D$_3$ will not raise mean 25(OH)D levels to the desired 80 nmol/L and that intakes of 800 to 1000 IU/d or more are needed by most older men and women (5).