

## **Effects of Vitamin D and Calcium Supplementation on Falls: A Randomized Controlled Trial**

### **Project: 283**

Heike A Bischoff,<sup>1,2</sup> Hannes B Stähelin,<sup>3</sup> Walter Dick,<sup>1</sup> Regula Akos,<sup>1</sup>  
Margrith Knecht,<sup>3</sup> Christian Salis,<sup>1</sup> Matthias Nebiker,<sup>1</sup> Robert Theiler,<sup>4</sup>  
Michael Pfeifer,<sup>5</sup> Bettina Begerow,<sup>5</sup> Robert A Lew,<sup>2</sup> and Martin Conzelmann<sup>6</sup>

Specific receptors for vitamin D have been identified in human muscle tissue. Cross-sectional studies show that elderly persons with higher vitamin D serum levels have increased muscle strength and a lower number of falls. We hypothesized that vitamin D and calcium supplementation would improve musculoskeletal function and decrease falls. In a double-blind randomized controlled trial, we studied 122 elderly women (mean age, 85.3 years; range, 63–99 years) in long-stay geriatric care. Participants received 1200 mg calcium plus 800 IU cholecalciferol (Cal+D-group; n = 62) or 1200 mg calcium (Cal-group; n = 60) per day over a 12-week treatment period. The number of falls per person (0, 1, 2–5, 6–7, >7 falls) was compared between the treatment groups. In an intention to treat analysis, a Poisson regression model was used to compare falls after controlling for age, number of falls in a 6-week pretreatment period, and baseline 25-hydroxyvitamin D and 1,25-dihydroxyvitamin D serum concentrations. Among fallers in the treatment period, crude excessive fall rate (treatment - pretreatment falls) was compared between treatment groups. Change in musculoskeletal function (summed score of knee flexor and extensor strength, grip strength, and the timed up&go test) was measured as a secondary outcome. Among subjects in the Cal+D-group, there were significant increases in median serum 25-hydroxyvitamin D (+71%) and 1,25-dihydroxyvitamin D (+8%). Before treatment, mean observed number of falls per person per week was 0.059 in the Cal+D-group and 0.056 in the Cal-group. In the 12-week treatment period, mean number of falls per person per week was 0.034 in the Cal+D-group and 0.076 in the Cal-group. After adjustment, Cal+D-treatment accounted for a 49% reduction of falls (95% CI, 14–71%;  $p < 0.01$ ) based on the fall categories stated above. Among fallers of the treatment period, the crude average number of excessive falls was significantly higher in the Cal-group ( $p = 0.045$ ). Musculoskeletal function improved significantly in the Cal+D-group ( $p = 0.0094$ ). A single intervention with vitamin D plus calcium over a 3-month period reduced the risk of falling by 49% compared with calcium alone. Over this short-term intervention, recurrent fallers seem to benefit most by the treatment. The impact of vitamin D on falls might be explained by the observed improvement in musculoskeletal function. (J Bone Miner Res 2003; 18:343–351)