

Vitamin D intake to attain a desired serum 25-hydroxyvitamin D concentration¹⁻³

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ABSTRACT

Background: Indirect evidence suggests that optimal vitamin D status is achieved with a serum 25-hydroxyvitamin D [25(OH)D] concentration >75 nmol/L.

Objective: We aimed to determine the intake of vitamin D₃ needed to raise serum 25(OH)D to >75 nmol/L.

Design: The design was a 6-mo, prospective, randomized, double-blinded, double-dummy, placebo-controlled study of vitamin D₃ supplementation. Serum 25(OH)D was measured by radioimmunoassay. Vitamin D₃ intake was adjusted every 2 mo by use of an algorithm based on serum 25(OH)D concentration.

Results: A total of 138 subjects entered the study. After 2 dose adjustments, almost all active subjects attained concentrations of 25(OH)D >75 nmol/L, and no subjects exceeded 220 nmol/L. The mean (\pm SD) slope at 9 wk [defined as 25(OH)D change/baseline dose] was 0.66 ± 0.35 (nmol/L)/(μ g/d) and did not differ statistically between blacks and whites. The mean daily dose was 86μ g (3440 IU). The use of computer simulations to obtain the most participants within the range of 75–220 nmol/L predicted an optimal daily dose of 115μ g/d (4600 IU). No hypercalcemia or hypercalciuria was observed.

Conclusions: Determination of the intake required to attain serum 25(OH)D concentrations >75 nmol/L must consider the wide variability in the dose-response curve and basal 25(OH)D concentrations. Projection of the dose-response curves observed in this convenience sample onto the population of the third National Health and Nutrition Examination Survey suggests a dose of 95μ g/d (3800 IU) for those above a 25(OH)D threshold of 55 nmol/L and a dose of 125μ g/d (5000 IU) for those below that threshold. *Am J Clin Nutr* 2008;87:1952–8.