

Effect of Vitamin D₃ Supplementation in Black and in White Children: A Randomized, Placebo-Controlled Trial

Kumaravel Rajakumar, Charity G. Moore, Jonathan Yabes, Flora Olabopo, Mary Ann Haralam, Diane Comer, Jaimee Bogusz, Anita Nucci, Susan Sereika, Jacqueline Dunbar-Jacob, Michael F. Holick, and Susan L. Greenspan

Department of Pediatrics (K.R., F.O., M.A.H.), and Center for Research on Health Care (C.G.M., J.Y., D.C.), University of Pittsburgh, Pittsburgh, Pennsylvania 15213; Department of Medicine (J.B., M.F.H.), Boston University School of Medicine, Boston, Massachusetts, 02118; Department of Nutrition (A.N.), Georgia State University, Atlanta, Georgia 30302; University of Pittsburgh School of Nursing (S.S., J.D.-J.), Pittsburgh, Pennsylvania 15213; and Department of Medicine (C.G.M., J.Y., D.C., S.L.G.), University of Pittsburgh, Pittsburgh 15213

Context: Dosages of vitamin D necessary to prevent or treat vitamin D deficiency in children remain to be clarified.

Objective: To determine the effects of vitamin D₃ 1000 IU/d on serum 25-hydroxyvitamin D [25(OH)D], PTH, and markers of bone turnover (osteocalcin and collagen type 1 cross-linked C-telopeptide) in black children and white children, and to explore whether there is a threshold level of 25(OH)D associated with maximal suppression of serum PTH concentration.

Design: Healthy 8- to 14-year-old Pittsburgh-area black (n = 84) and white (n = 73) children not receiving vitamin supplements, enrolled from October through March from 2008 through 2011, were randomized to vitamin D₃ 1000 IU or placebo daily for 6 months.

Results: The mean baseline concentration of 25(OH)D was <20 ng/mL in both the vitamin D-supplemented group and the placebo group (19.8 ± 7.6 and 18.8 ± 6.9 ng/mL, respectively). The mean concentration was higher in the supplemented group than in the placebo group at 2 months (26.4 ± 8.1 vs 18.9 ± 8.1 ng/mL; P < .0001) and also at 6 months (26.7 ± 7.6 vs 22.4 ± 7.3; P = .003), after adjusting for baseline 25(OH)D, race, gender, pubertal status, dietary vitamin D intake, body mass index, and sunlight exposure. Increases were only significant in black children, when examined by race. The association between 25(OH)D and PTH concentrations was inverse and linear, without evidence of a plateau. Overall, vitamin D supplementation had no effect on PTH and bone turnover.

Conclusions: Vitamin D₃ supplementation with 1000 IU/d in children with mean baseline 25(OH)D concentration <20 ng/mL effectively raised their mean 25(OH)D concentration to ≥20 ng/mL but failed to reach 30 ng/mL. Vitamin D supplementation had no effect on PTH concentrations. (*J Clin Endocrinol Metab* 100: 3183–3192, 2015)

Maintaining adequate vitamin D status is essential for calcium homeostasis and skeletal health. However, hypovitaminosis D is common in healthy children living in the northeastern United States, and its prevalence

and severity are greater in black than in white children (1). Circulating concentration of 25-hydroxyvitamin D [25(OH)D] is the recognized biomarker of vitamin D status. Definition of a 25(OH)D cutoff level for optimal skel-

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Abbreviations: BMI, body mass index; CTx, collagen type 1 cross-linked C-telopeptide; CV, coefficient of variation; DBP, vitamin D-binding-protein; OC, osteocalcin; 25(OH)D, 25-hydroxyvitamin D; Δ, change.