

Abstract

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Genetic polymorphisms of the vitamin D binding protein and plasma concentrations of 25-hydroxyvitamin D in premenopausal women.

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BACKGROUND: Vitamin D status, determined on the basis of 25-hydroxyvitamin D [25(OH)D] concentrations, is associated with the risk of several diseases. Vitamin D binding protein (DBP) is the major carrier of vitamin D and its metabolites, but the role of DBP single nucleotide polymorphisms (SNPs) on 25(OH)D concentrations is unclear.

OBJECTIVE: The objective was to evaluate the association of 2 DBP gene SNPs with 25(OH)D concentrations and explore whether such association varies according to the amount of vitamin D that needs to be transported.

DESIGN: This cross-sectional study included 741 premenopausal white women, mostly of French descent. Plasma 25(OH)D concentrations were measured by radioimmunoassay. DBP-1 (rs7041) and DBP-2 (rs4588) were genotyped with a Sequenom MassArray platform. Associations and interactions were modeled by using multivariate linear regression.

RESULTS: DBP-1 and DBP-2 SNPs were in strong linkage disequilibrium and were both associated with 25(OH)D concentrations. An additional copy of the rare allele of DBP-1 or DBP-2 was associated with lower 25(OH)D concentrations (beta = -3.29, P for trend = 0.0003; beta = -4.22, P for trend < 0.0001, respectively). These DBP polymorphisms explained as much of the variation in circulating 25(OH)D as did total vitamin D intake (r² = 1.3% for DBP-1, r² = 2.0% for DBP-2, and r² < or = 1.2% for vitamin D intake).

CONCLUSION: Circulating 25(OH)D concentrations in premenopausal women are strongly related to DBP polymorphisms. Whether DBP rare allele carriers have a different risk of vitamin D-related diseases and whether such carriers can benefit more or less from dietary interventions, vitamin D supplementation, or sun exposure need to be clarified.

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