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Vitamin D Binding Protein and Vitamin D Status of Community Dwelling Black and White Americans

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BACKGROUND: Low vitamin D is common among black Americans. Vitamin D binding protein has not been considered in assessing vitamin D status.

METHODS: In the Healthy Aging in Neighborhoods of Diversity across the Life Span (HANDLS) cohort of community-dwelling blacks and whites (N=2085), we measured total 25-hydroxyvitamin D, vitamin D binding protein, blood calcium and parathyroid hormone, and bone mineral density. We studied the influence of single nucleotide polymorphisms in the vitamin D binding protein gene (rs7041, rs4588) on total 25-hydroxyvitamin D and vitamin D binding protein levels. Among homozygous subjects, we estimated bioavailable (non-vitamin D binding protein-bound) 25-hydroxyvitamin D.

RESULTS: Both total 25-hydroxyvitamin D and vitamin D binding protein levels were lower in blacks compared to whites (mean ± standard error; 25-hydroxyvitamin D: 15.6±0.2 versus 25.8±0.4 ng per ml, P<0.001; vitamin D binding protein: 168±3 versus 337±5 mcg per ml, P<0.001). Vitamin D binding protein polymorphisms independently explained 79% and 10% of variation in vitamin D binding protein and total 25-hydroxyvitamin D levels, respectively. After accounting for these polymorphisms, race explained less than 1% of variation in vitamin D binding protein levels and 7% of variation in total 25-hydroxyvitamin D levels. Calcium levels (9.11±0.01 versus 8.99±0.01 mg per dl) and bone mineral density (1.05±0.01 versus 0.94±0.01 g per cm2) were higher in blacks than whites (P<0.001 for both comparisons). Although parathyroid hormone increased with decreasing total and bioavailable 25-hydroxyvitamin D levels (P<0.001), blacks had significantly lower total 25-hydroxyvitamin D levels than whites within each parathyroid hormone quintile. In contrast, homozygous black and white subjects had similar bioavailable 25-hydroxyvitamin D levels overall (2.9±0.1 versus 3.1±0.1 ng per ml, P=0.71) and within each parathyroid hormone quintile.

CONCLUSION: Many black Americans have low total 25-hydroxyvitamin D levels without classic manifestations of vitamin D deficiency. Accounting for vitamin D binding protein levels and genetics may improve assessment of vitamin D status in black Americans.

Nothing to Disclose: CEP, MKE, JW, ABZ, AB, MN, HT, IB, SAK, NP, RT

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