

Relationship Between 25(OH) Vitamin D₃ and Cerebral Vascular Reactivity in College-aged African and Caucasian Americans

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ABSTRACT

African-Americans (AA) are at a greater risk for developing a variety of cardiovascular and cerebrovascular diseases relative to their Caucasian (CA) counterparts. The underlying impairments manifest as early as the second generation of life, prior to any overt signs of risk. The increase in cerebral blood flow and/or vascular conductance during hypercapnia, termed cerebral vasomotor reactivity (CVMR), is commonly used in clinical and research settings to assess cerebral vascular function. Reduced CVMR during hypercapnia is present in a variety of at risk and diseased populations and is believed to be, not only a predictor, but also a contributor to stroke. Previously, we demonstrated that CVMR is significantly reduced in college-aged AAs relative to CAs. The mechanisms resulting in this increased CVD risk are multifactorial; however, recent evidence suggests that Vitamin D deficiency may be a contributing factor. To our knowledge the relationship between CVMR and Vitamin D status has not been examined in a cohort of relatively young, otherwise healthy individuals.

PURPOSE: In an effort to determine the relationship between CVMR and Vitamin D status, we tested the hypothesis that there would be a positive relationship between CVMR and plasma 25(OH) Vitamin D₃ concentration.

METHODS: In 19 CA and 11 AA subjects, CVMR was assessed using the cerebral vascular conductance (CVC) response to rebreathing-induced hypercapnia. Plasma 25(OH) Vitamin D concentration was determined using an ELISA.

RESULTS: CVMR was attenuated during rebreathing-induced hypercapnia in the AAs relative to CAs (AA: 3.05 ± 0.38 % / Torr vs. CA: 5.10 ± 0.29 % / Torr; $p < 0.001$). Vitamin D concentration was also reduced in the AAs relative to CAs (AA: 14.96 ± 3.06 ng/mL vs. CA: 36.35 ± 3.98 ng/mL; $p < 0.001$). However, when data from all subjects were included there was no relationship between CVMR and plasma 25(OH) Vitamin D ($R = -0.19$, $p = 0.37$).

CONCLUSION: These data indicate that CVMR is not correlated to Vitamin D status, thus it seems reasonable to speculate that the impaired CVMR in AAs is not related to a reduced Vitamin D status in this population.