PTH Response May Explain Higher BMD in Blacks

BY JEFF EVANS
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ARLINGTON, VA. — African Americans may have a lower rate of osteoporosis-related fractures than whites because of adaptations in calcium homeostasis, bone turnover and resorption, and response to parathyroid hormone, Dr. Felicia Cosman said at a conference sponsored by the American Society for Bone and Mineral Research.

It is "very surprising" that at all ages, black individuals have a lower rate of fractures and higher bone mineral density (BMD) than white individuals, even though blacks generally have higher rates of vitamin D deficiency or insufficiency, said Dr. Cosman, medical director of the Clinical Research Center at Helen Hayes Hospital, West Haverstraw, N.Y.

Mean serum levels of 25-hydroxyvitamin D [25(OH)D] are known at all ages and in both genders to be generally lower in blacks than in whites. This is the result of reduced skin production of vitamin D (due to higher melanin content in the skin) and a lower dietary intake of vitamin D, Dr. Cosman said.

An alteration in the vitamin D–endocrine system in blacks was first proposed by Dr. Norman Bell; it was based on evidence that blacks have a greater prevalence of vitamin D deficiency and relative secondary hyperparathyroidism, lower levels of bone turnover, and increased urinary calcium retention as an adaptive means to maintain calcium homeostasis without sacrificing the skeleton (J. Clin. Invest. 1985;76:470-3).

In many studies, parathyroid hormone (PTH) levels are higher, on average, in blacks than in whites. The PTH levels found in blacks occur within the context of low calcium intake in addition to low 25(OH)D levels, which may be related to "real or perceived" lactose intolerance, Dr. Cosman said. As a result of high PTH levels, blacks have generally been measured with higher 1-25dihydroxyvitamin D [$1,25(OH)_2D$] levels than have whites.

"We would expect that with higher $1,25(OH)_2D$ levels, you would see greater [dietary] calcium absorption in black individuals compared to whites," but studies have reported inconsistent data, many of which have shown no significant interracial differences, she said.

PTH caused blacks to retain urinary calcium to a greater degree than it did in whites, but it did not cause any racial differences in bone formation markers.

One would also expect blacks to have higher bone turnover levels because of high PTH levels, but in general this has not been true, Dr. Cosman said.

However, nearly all studies of the kidney have found that blacks have lower urinary calcium excretion than whites.

In addition, supplementation of $1,25(OH)_2D$ has been shown to cause a significantly greater decrease in urinary calcium excretion in blacks than in whites. Markers of bone formation also increased more among blacks than among whites, whereas bone resorption indices showed no racial differences (Osteoporos. Int. 2000;11:271-7). In a separate study, administration of PTH also caused blacks to retain urinary calcium to a greater degree than it did in whites, but it did not cause any racial differences in bone formation markers. After receipt of PTH, blacks also did not have as great an increase in bone resorption markers (J. Bone Miner. Res. 1997;12:958-66). This finding directly confirms "the hypothesis that the black skeleton could be resistant to the acute bone resorptive effects of PTH," she said.

Studies of histomorphometric differences in bone have shown significantly reduced bone formation rates and a longer total bone formation period in blacks, compared with whites. The results of those studies are consistent with evidence that blacks have a lower level of serum osteocalcin—which has been the most sensitive indicator of a racial difference in bone turnover levels—and that blacks respond more slowly to bone remodeling therapies.

"The bottom line message … for these measurements is that in a relative secondary hyperparathyroid state you really expect to see high [bone] turnover," Dr. Cosman said. "We never see that. We see either the same or, in most cases, lower turnover in blacks." ■