Bone Structure Explains Racial Variance in Fractures

BY KERRI WACHTER
Senior Writer

PHILADELPHIA — Bone geometry appears to confer femoral strength to older black men and may account for some of the differences seen in fracture risk and bone mineral density between older black and white men, according to data presented at the annual meeting of the American Society for Bone and Mineral Research.

Dr. Marc C. Hochberg, professor of medicine and epidemiology at the University of Maryland, Baltimore, and his colleagues used hip structural analysis based on dual-energy x-ray absorptiometry (DXA) scan data to assess parameters of structural geometry of the proximal femur in older black and white men, in an attempt to account for reported differences in hip fracture and hip bone mineral density (BMD).

Older African American men have smaller bones, greater BMD, thicker cortices, and lower buckling ratios, which reduce fracture risk with bending.

The researchers used data collected as part of the Baltimore Men's Osteoporosis Study, which recruited 503 white men and 191 black men aged 65 years and older. Black men were slightly heavier (mean weight 87 kg vs. 83 kg for white men) and slightly younger (mean age 72 years vs. 75 years for white men).

The researchers used hip structural analysis to calculate several measures of bone geometry, including the outer diameter, the bone cross-sectional area, the section modulus (an indicator of bending strength), the estimated mean cortical thickness, and the estimated buckling ratio (an estimate of cortical stability in buckling) from DXA hip scans.

Hip structural analysis is an investigational technique used to assess bone geometry in cross-sections of three regions of the proximal femur: across the femoral neck at its narrowest point, in the intertrochanteric region (along the angle bisecting neck and shaft axes), and across the shaft (at a distance of 1.5 times the minimum neck width distal to the axes of intersection).

The geometric parameters were compared between racial groups, using age, height, lean mass, and lean mass fraction as covariates.

BMD was greater for black men at the narrow neck, intertrochanteric, and shaft regions. "Black men had more bone tissue and the bone was narrower, so the tissue was enclosed in a smaller volume," said Dr. Hochberg.

However, there was no difference in the calculated section modulus (a measure of resistance to axial bending) between white and black men at any of the three sites.

"Since there were no differences in femur bending resistance between the black and the white men, narrower bone, therefore, requires more bone tissue to achieve the same bending strength," said Dr. Hochberg. Narrower bone with thicker cortices would have a lower buckling ratio and, therefore, higher buckling strength.

Cortical thickness was significantly greater in black men than in white men at all three sites. This did correlate to lower buckling ratios, providing greater protection against buckling failure.

Overall, black men had greater cross-sectional area, which reflects more bone mass. They also had a narrower outer diameter (reflecting smaller bone), thicker cortices, and lower buckling ratios, which reduce the risk of failure on bending at all three sites within the hip. "These geometric factors may explain the lower rate of hip fracture in older black men than in older white men," said Dr. Hochberg. ■

DHEA, Testosterone Show No Antiaging Benefits

BY MARY ANN MOON
Contributing Writer

Neither dehydroepiandrosterone nor testosterone replacement improve body composition, physical performance, bone mineral density, insulin sensitivity, or quality of life in people over age 60 years who have low androgen levels, according to Dr. K. Sreekumarian Nair of the Mayo Clinic, Rochester, Minn., and his associates.

"The search for eternal youth will continue, but the reversal of age-related decreases in the secretion of DHEA [dehydroepiandrosterone] and testosterone through 'physiologic' replacement regimens offers no answer and should not be attempted," Dr. Paul M. Stewart said in an editorial comment accompanying the report of Dr. Nair's findings, published in the Oct. 19 issue of the New England Journal of Medicine.

Dr. Nair and his associates conducted a 2-year study to assess the effects of full DHEA replacement in 57 women and low-dose testosterone replacement in 87 men whose low hormone levels placed them in the 15th percentile for normal younger men and women. These healthy subjects were randomly assigned to receive either active or placebo tablets and transdermal patches, and were evaluated every 3 months.

Both total and bioavailable levels of the hormones rose significantly in the subjects who received active treatment, to values that would be considered in the high-normal range for young adults. However, neither treatment "had any detectable effect on physical performance, insulin sensitivity, or the physical and mental components of the quality of life," the investigators said (N. Engl. J. Med. 2006;355:1647-59).

Testosterone replacement caused a small but significant increase in fat-free mass, but no change in muscle area, muscle strength, or overall fitness.

Similarly, both DHEA and testosterone caused a small but significant increase in bone mineral density at the ultradistal radius in women and at the femoral neck in men. However, there were no bone mass changes at several other sites, and the magnitude of the beneficial effect was less than that reported with conventional osteoporosis therapies.

The findings confirm that neither DHEA nor testosterone is "an effective antiaging hormone supplement and argue strongly against the use of these agents for this purpose," they noted.

In his editorial comment, Dr. Stewart observed that "another 'negative' study on the efficacy of DHEA is unlikely to have much effect on its use in Western societies." Legally, it is classified as a dietary supplement rather than a drug, and as such it will continue to be used inappropriately, "and quackery will prevail," he said (N. Engl. J. Med. 2006;255:1724-6).

"Companies that sell supplements may not claim that the products prevent, treat, cure, mitigate, or diagnose disease, but these guidelines are often ignored or circumvented, as appears to be the case with many current providers of DHEA," said Dr. Stewart of the University of Birmingham (England). ■

Older African American Women Come Up Short on Vitamin D

BY PATRICE WENDLING
Chicago Bureau

TUCSON, ARIZ. — Customary vitamin D supplementation and springtime sun exposure in the southern United States are inadequate to protect elderly African American women from vitamin D deficiency and osteoporosis, data from a prospective cohort study show.

Not only were most of the women deficient in vitamin D despite 6 weeks of supplementation and nearly 10 hours a week of Texas vernal sunshine, but an unexpectedly high number were osteoporotic or osteopenic, Dr. Sally Weaver and associates reported in a poster at the annual meeting of the North American Primary Care Research Group.

Darker skin pigmentation and aging are known to decrease the body's ability to synthesize vitamin D. But it has generally been assumed that sun exposure in southern latitudes is either sufficient to provide adequate vitamin D levels or would reduce the need for supplementation.

The study included 44 African American women living in central Texas who were given 1,000 mg of calcium with 400 IU vitamin D tablets daily for 6 weeks, and told not to make any changes in diet or sun exposure. Clinical evaluations were made at baseline in April and 6 weeks later in June.

That time frame was chosen because, theoretically, 6 weeks is enough time for the body to replenish its supply of vitamin D if it is deficient, and because sun exposure typically increases in the spring, said Dr. Weaver, research director for the McLennan County Medical Education and Research Foundation, in Waco, Tex.

Overall, 36 (82%) of women returned for follow-up. Their average age was 76 years (range 70-88 years) and average BMI (kg/m^2) was 32; 37 women (84%) had vitamin D levels lower than 32 ng/mL. The women were active, in good health without any conditions that would affect their vitamin D levels, and spent an average of 9.6 hours per week in the sun.

The investigators chose 32 ng/mL as the cutoff for "normal" vitamin D levels because there is some work that supports this value as the minimum needed for bone health, Dr. Weaver said. The ideal cutoff is under debate: Many levels use 20-25 ng/mL, but many researchers use higher values, such as 30-32 ng/mL, she said.

No matter which measure was used, the majority of women remained vitamin D deficient. After 6 weeks of supplementation, 23 women (52%) had vitamin D levels lower than 20 ng/mL, 29 (66%) had levels lower than 25 ng/mL, and 37 (84%) had levels lower than 32 ng/mL. Moreover, some women's levels were inexplicably lower after supplementation. Changes in vitamin D levels varied widely, from a loss of 10 ng/mL to a gain of 19 ng/mL over the course of the study. The lower the women's levels at baseline, the more likely they were to show an increase, she said.

Overall, 24 of the women (55%) were osteopenic and 11 (25%) were osteoporotic. The finding was surprising because greater weight is associated with stronger bones, she said. Only 13 (30%) of patients were on medication for the prevention or treatment of osteoporosis or osteopenia.

The average bone mineral density T score was –1.7, with a range of 1.7 to –4.0. Interestingly, T scores were not correlated with vitamin D levels. This could be because of the high number of osteopenic patients in the population, she said.

The amount of sun exposure was not correlated with vitamin D levels or T scores at the beginning or end of the study. "I believe that the combination of darker skin pigmentation and older age is preventing adequate sun conversion of vitamin D to an active form, even in a southern latitude, leading these patients to require much higher doses of oral supplements," Dr. Weaver said. ■