

## Bone Area Also Affected

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were considered vitamin D deficient. Among 556 neonates, those whose mothers were vitamin D deficient had lower mean bone area, at 110 cm<sup>2</sup>, compared with those whose mothers were vitamin D replete, at 119 cm<sup>2</sup>.

Mean bone mineral content of babies of the deficient mothers also was lower at 58 g, compared with 63 g in those whose mothers were replete, Dr. Harvey said at the meeting, which was sponsored by the International Osteoporosis Foundation.

Previous work by Dr. Harvey's group had suggested that the reduced bone mass in babies whose mothers were vitamin D deficient was mediated by levels of venous umbilical cord calcium (*Lancet* 2006;367:36-43). "This finding set us to thinking about placental calcium transport as a key factor," he said.

Although placental calcium transport has not been fully characterized in humans, it appears that calcium crosses from the maternal circulation by facilitated transporters and is carried across the cytosol bound to calcium-binding proteins, Dr. Harvey explained.

The calcium is then taken into fetal circulation across a sodium-calcium exchanger or, more critically, by a series of adenosine triphosphate-dependent plasma membrane calcium transporters

that are known as PMCA 1 through 4. The result is a positive calcium gradient from the mother to the fetus, he said.

PMCA gene expression was measured in placental tissue obtained from 70 healthy deliveries in this cohort within a half hour of birth.

The tissue was frozen in liquid nitrogen, the RNA was extracted using a commercial kit, and quantitative real-time polymerase chain reaction was used to measure the levels of RNA for the PMCA genes.

After controlling for beta-actin gene expression, Dr. Harvey said, PMCA3 mRNA expression predicted neonatal whole body bone area, placental weight, and birth weight.

"We have demonstrated that expression of a placental calcium transport gene is associated positively with bone area and mass in the offspring, and we suggest that this may explain at least in part the mechanism whereby the mothers' vitamin D status influences the neonate's bone mass," he said.

"Further elucidation of this process may allow development of novel therapeutic strategies to optimize childhood bone mineral accrual and to decrease the occurrence of osteoporotic fractures in future generations," Dr. Harvey said. ■

## Low BMD Predicts Scoliosis Progression in Adolescents

BY NANCY WALSH  
New York Bureau

TORONTO — Low bone mineral density in patients with adolescent idiopathic scoliosis is predictive of worsening of the spinal curvature, according to findings from a new Chinese study presented at a world congress on osteoporosis.

Previous studies have shown that adolescent idiopathic scoliosis (AIS) patients have significantly lower bone mass than do age- and sex-matched controls, but it has not previously been determined whether low bone mineral density (BMD) should be added to the list of risk factors for progression, according to Dr. V.W.Y. Hung of the department of orthopedics and traumatology, Prince of Wales Hospital, the Chinese University of Hong Kong.

In order to address this, researchers enrolled 324 girls with AIS and 276 controls aged 11-16 years in a prospective study. On recruitment, all had lumbar spine and bilateral femoral neck BMD measurements using dual energy x-ray absorptiometry (DXA), and age-adjusted z scores were calculated. Patients with scores of -1 or less were consid-

ered to have osteopenia, and progression of the spinal curvature was defined as an increase of 6 degrees on any two sequential spinal x-rays.

The hips were defined as concave and convex according to their relation to the convexity of the spine. For example, if the patient had a right thoracic curve,

**Findings from DXA screening might serve as an objective measure to predict curve progression and help physicians predict risk.**

the right hip was defined as the convex-side hip (*J. Bone Joint Surg.* 2005;87:2709-16). Clinical and radiographic assessments were done every 6 months.

Mean age at diagnosis was 13.5 years, and the average initial Cobb angle was 24 degrees. The prevalence of osteopenia at the spine and hip was 27.5% and 23.1%, respectively.

Study participants were followed for a mean of 3.5 years. Data on hip BMD, which is considered more reliable than spinal BMD in adolescents, were available for 318 patients.

On logistic regression analysis,

low bone mass at the concave side of the femoral neck was found to be a significant factor for scoliosis progression, with an odds ratio of 2.3, Dr. Hung said at the meeting, which was sponsored by the International Osteoporosis Foundation.

Other significant predictors were younger age and premenarcheal status at diagnosis, lower Risser grade, and a greater initial Cobb angle.

Follow-up BMD measurements done at the time skeletal maturity was reached found that low BMD persisted in 85% of AIS patients. Persistently low BMD at skeletal maturity may result in lower peak bone mass and increased risk for fractures later in life, Dr. Hung said.

"This is the first study to show that low bone mass plays an important role in predicting curve progression," she said. While the cause of low BMD in AIS patients is unclear, some studies have suggested that inadequate calcium intake and insufficient exercise may contribute. These findings suggest that DXA screening might serve as an objective measurement to predict curve progression and might also help physicians predict risk. ■

## Teen Elite Cross-Country Skiers At Greater Risk for Kyphosis

BY MARY ANN MOON  
Contributing Writer

Adolescent elite cross-country skiers show increased thoracic kyphosis over time, which contributes to their high incidence of low back pain and might put them at risk for hyperkyphosis.

Noting numerous reports in the literature of a high rate of low back pain in young skiers, Dr. Marie Alricsson of Mid Sweden University, Östersund, and Dr. S. Werner of the Karolinska Institute, Stockholm, hypothesized that the flexed position of the spine in classical cross-country skiing might eventually cause increased thoracic curvature in growing adolescents. They assessed possible changes in the spinal curvature of 15 adolescent members of an elite cross-country ski team before and after 5 years of intensive skiing.

The seven boys and eight girls had a mean age of 13.6 years at the start of the study. At 5-year follow-up, "the relationship between thoracic kyphosis and lumbar lordosis increased from 3.5 degrees to 13.1 degrees," the investigators re-

ported (*Phys. Ther. Sport* 2006 June 26 [Epub doi:10.1016/j.ptsp.2006.06.003]).

"This means that growing individuals [who] participate in cross-country skiing might develop a hyperkyphosis over time," they added.

Seven subjects reported low back pain. They "showed a significantly higher relationship between thoracic kyphosis and lumbar lordosis than did those skiers without low back pain, 18.2 degrees and 10.5 degrees, respectively," the researchers said.

Seven of the eight subjects who did not report low back pain at follow-up had participated in other sports at least once per week for the preceding 3 years. "It is likely that participating in other sports might at least to some extent prevent or reduce development of low back pain in cross-country skiers. ...[It] might promote a more all-round type of body exercise, which could 'balance' the sport-specific training" of elite cross-country skiing, the researchers said.

They advised that adolescent cross-country skiers regularly participate in other physical activities or sports concurrently with their skiing. ■

## Giving Vitamin D Cheaper Than Treating Deficiency, Study Finds

BY JONATHAN GARDNER  
London Bureau

Treating children of Asian origin with a 2-year course of vitamin D supplementation might reduce the increased rate of rickets, hypocalcemia, and related conditions that are seen in these children.

This conclusion is based on a British analysis of the costs associated with treating children with complications of vitamin D deficiency. The Burnley National Health Service Trust, which serves a population of 242,000 in northwest England, including many of Asian descent, spent an average of £2,500 (\$4,675) per case. By supplementing Asian children with vitamin D for the first 2 years of their lives, the expected cost of prevention of vitamin D deficiency is £2,400 (\$4,488) per avoided case, investigators said (*Arch. Dis. Child.* 2006;doi:10.1136/adc.2006.098467).

Vitamin D supplementation has been on the decline in the United Kingdom. In 1995, 12% of babies received supplementation. In 2000, it was given to 4%, wrote Christos S. Zepitis of Burnley General Hospital Lancashire, England, and associates.

The Burnley Health Care NHS Trust identified all patients presenting to the pediatric

department between January 1994 and May 2005 whose records included the words "rickets," "hypocalcemic tetany," and "hypocalcemic convulsions." They identified vitamin D deficiency based on bowlegs, tetany, convulsions resulting from hypocalcemia, radiologic evidence, or biochemistry.

There were 14 cases of vitamin D deficiency, 13 of them in children of Asian descent. Eight were initially seen for other conditions, such as eczema or lower respiratory tract infections. The total treatment cost for the 14 was £35,075.12 (\$65,590.47), or £2,505.37 (\$4,685.04) per patient. The prevalence of vitamin D deficiencies in the entire Burnley NHS population is one case for every 923 children, so preventing a single case of rickets would cost £19,013.80 (\$35,554.31) if children got multivitamin drops for 2 years.

But at a prevalence of one case of vitamin D deficiency for every 117 Asian children, the cost to prevent one case of rickets would be £2,410.20 (\$4,507.07), almost 100 pounds (\$187) less than treating a case of vitamin D deficiency. "We therefore suggest that supplementation with vitamin D of all babies of Asian origin for the first 2 years of life might be the economic answer to a growing problem," they wrote. ■