BONE DENSITY & OSTEOPOROSIS:

An Update for Manitoba Physicians

No. 4: May 31, 2002

Re: CLINICAL RISK FACTORS IN THE ASSESSMENT OF OSTEOPOROSIS

WHY CALCULATE THE RISK SCORE ON THE BMD REQUISITION?

Using a bone density test …has not been shown to reduce the burden of fractures

Simply using a bone density test to screen women at low risk for osteoporosis has not been shown to reduce the burden of fractures. The question remains, "How can I identify those women who are at substantially increased risk of fracture?".

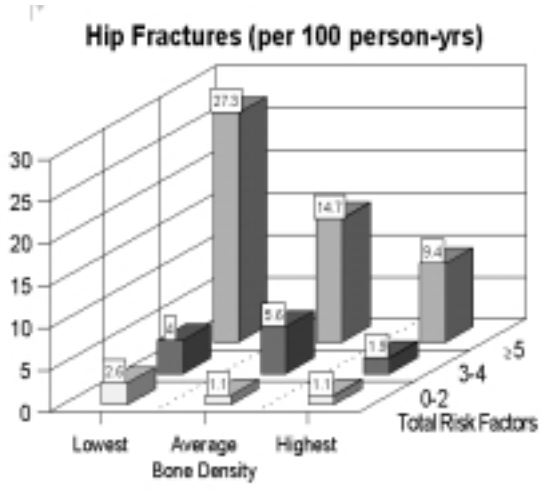
Currently, the best source of fracture data comes from large prospective cohort studies such as the Study of Osteoporotic Fractures (SOF) which has been prospectively following over 9,700 post-menopausal women to determine the clinical and laboratory measures that best predict fracture (NEJM 1995;332:767). This and similar studies clearly demonstrated the important and *independent* predictive power of clinical risk factors as determinants of susceptibility to hip and vertebral fracture (Osteoporos Int 2001;12:519). When there are few clinical risk factors then hip fractures are uncommon, even among women with low bone density. Conversely, most women who ultimately fracture their hips are not osteoporotic according to bone density (ie. hip T-score not more than 2.5 standard deviations below average for a young, healthy woman).

Also, there is no evidence that pharmacologic treatment in individuals with only clinical risk factors reduces the rate of hip fracture (NEJM 2001;344:1721). Therefore, targeted testing of bone density is recommended when clinical risk factors are present. Ultimately, fall prevention strategies (such as hip protectors) may be more successful in those whose risk largely relates to frequent falls.

There is an independent interaction between BMD and clinical risk factors

The following point cannot be overstated: *the interaction between bone density and many clinical risk factors is independent (see Figure).* This fact offers a rational and efficient way to target bone density testing towards women at greatest risk.

With some modifications, this is the basis for the scoring method that has been adopted in Manitoba for use by physicians wanting to order a BMD. Many of these risk factors are predictors of falling--an integral (but frequently overlooked) component in the fracture susceptibility equation.



WHAT IS THE SIGNIFICANCE OF A FAMILY HISTORY OF OSTEOPOROTIC FRACTURE?

80% of BMD variability is related to hereditary factors

The genetic determinants of bone density and osteoporotic fracture risk are poorly understood but are currently the focus of active research. It is likely to yield dramatic insights into the pathophysiology and treatment of metabolic bone disease. Studies done in twins indicate that up to 80% of the variability in bone density measurement is related to hereditary factors, though the specific genes responsible for this remain elusive. Only a small number of osteoporotic patients have a recognizable primary genetic disorder (such as osteogenesis imperfecta). For the remainder, a polygenic pattern of inheritance is presumed to be present.

Maternal history of hip fracture doubles the risk of fractures in daughters

Regardless of the specific genes involved, prospective cohort studies have indicated the importance of family history (which reflects both hereditary and environmental factors) in fracture risk assessment. For example, the Study of Osteoporotic Fractures (SOF) found that a maternal history of hip fracture doubles the risk of hip fracture in the daughter even after adjustment for hip bone density. Thus, the familial effect is not simply related to bone density and may also be mediated by body habitus, femoral geometry, or still unidentified heritable or environmental factors.

Stay tuned for more research on the genetic link(s) to fracture

Other studies suggest that osteoporotic fracture in any first degree relative carries a similar risk. Therefore, a family history of osteoporotic fracture (and most importantly, maternal hip fracture) should be routinely obtained during the clinical evaluation of osteoporotic risk factors (see Osteoporosis Update, Fall 2001, 5(4):6). Whether low bone density in a close family member (in the absence of fractures) is as strong an indicator of increased fracture risk is not yet clear, however. Additional research is needed to confirm these findings and to define the pathophysiologic mechanisms concerned. Stay tuned!

HOW TO SAY NO TO BMD TESTING IN LOW RISK POSTMENOPAUSAL WOMEN

Are we preventing the right disease?

First and foremost, she should understand that bone density testing has not been demonstrated to be a strong hip fracture predictor in low risk individuals. Although a normal bone density measurement may be reassuring from the perspective of osteoporosis, in the low risk woman this may actually be misleading since cardiovascular disease is the major enemy.

Adopting non-pharmacological prevention strategies may be best

There is good evidence that anyone concerned about osteoporosis should adopt specific lifestyle measures independent of any bone density value, including: maintaining an adequate level of calcium and vitamin D intake; maintaining weight-bearing exercise; avoidance of smoking, excessive alcohol or long-acting sedatives; wearing safe footwear; and modifying homes to eliminate loose rugs or dark hallways.

From the Manitoba Bone Density Program

This newsletter and other program information are available through the Manitoba Health web site (http://www.gov.mb.ca/health/programs/mbd/index.html).