


OSTEOPOROSIS

Not all BMD is created equal

Antiresorptive and anabolic therapies have different effects on bone mineralization density distribution (BMDD), a measure of the distribution of calcium concentration across the bone matrix. This finding was reported by David Dempster and colleagues in the *Journal of Bone and Mineral Research*.

Osteoporosis is commonly treated with antiresorptive agents, which decrease bone turnover and allow more time for secondary mineralization of existing bone to occur, or with anabolic agents, which increase bone turnover and therefore new bone formation.

Both classes of agents increase bone mineral density (BMD). Dempster and colleagues had previously conducted a histomorphometric analysis on biopsy samples collected from postmenopausal women with osteoporosis that showed that treatment with zoledronic acid, an antiresorptive agent, or teriparatide, an anabolic agent, had opposite effects on bone formation indices.

In their new study, the researchers used quantitative backscattered electron imaging to measure the amount of mineralized calcium in bone per unit volume of bone matrix in biopsy samples collected from postmenopausal women enrolled in the SHOTZ study. “We chose this approach because it is the only methodology available that allows for direct quantitation of the mineralization density at the bone tissue level,” explains Dempster. BMDD provides information about key aspects of bone metabolism, such as bone turnover, mineralization kinetics, average bone matrix age, elasticity, strength and toughness.

The biopsy samples were taken from the iliac crest of patients after 6 months and 24 months of therapy with one of the two drugs. Complete data were available for 10 patients treated with zoledronic acid and 10 patients treated with teriparatide. The study was supported by Eli Lilly.

Women treated with zoledronic acid had higher mineralization density and more homogeneous mineral content than women treated with teriparatide at the two time points analysed. Furthermore, zoledronic acid therapy was associated with an increase in mineralization density between 6 and 24 months, whereas no such increase was observed among patients who received teriparatide (which reflects the ongoing deposition of new bone that occurs when teriparatide is used). “The results of this first head-to-head study of BMDD comparing these two drug classes show that while both agents increase BMD, the underlying mechanisms are fundamentally different,” says Dempster.

Dempster and colleagues are now comparing other material properties of the organic bone matrix of patients treated with these two therapeutic agents. “We are also assessing the utility of biochemical biomarkers of bone collagen age to further understand and differentiate the mechanism of action of these medicines on skeletal properties over time,” adds Dempster.

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ORIGINAL ARTICLE Dempster, D. W. et al. Differential effects of teriparatide and zoledronic acid on bone mineralization density distribution at 6 and 24 months in the SHOTZ study. *J. Bone Miner. Res.* <http://dx.doi.org/10.1002/jbmr.2825> (2016)

