

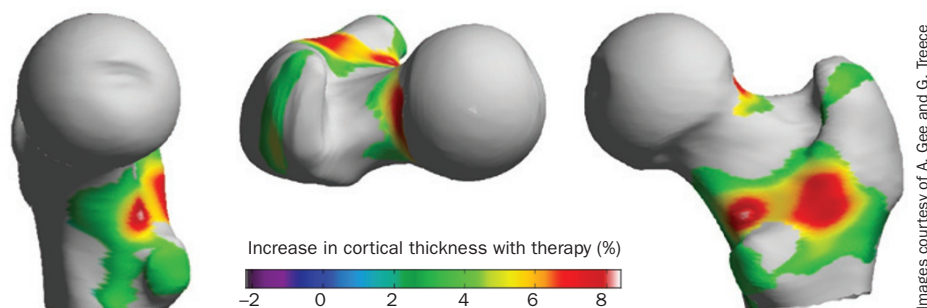
METABOLIC BONE DISEASES

Mapping therapy-induced changes to osteoporotic bone

Anabolic treatment with parathyroid hormone (PTH) is effective in stimulating bone formation in patients with osteoporosis, but where precisely is the new bone laid down? A novel tool for measuring skeletal structures *in vivo* demonstrates that cortical thickening occurs at sites frequently associated with hip fracture.

The technique, developed by engineers at the University of Cambridge, uses mathematical analysis of standard CT images to yield a color map of the bone surface that is sensitive to cortical thickness changes of ~30 microns. In a study published in *PLoS ONE*, this method was used to map bone changes in response to therapy with teriparatide, a recombinant form of PTH, in postmenopausal women with advanced osteoporosis who were enrolled in the multicenter EUROFORS study.

Using CT images of 119 femurs from 65 women, cortical thickness in the hip was measured and mapped at baseline



Images courtesy of A. Gee and G. Treece

and after 24 months of treatment. “We found that, during 2 years of teriparatide treatment, new bone was laid down at several sites that commonly break during a fracture,” reports Ken Poole, who led the UK-based analysis. Notably, these regions of bone regeneration are sites associated with increased stress during locomotion. No additional thinning was observed, contrary to what would be expected in older women with severe osteoporosis.

“This is exciting because it proves that even in this patient population bone drugs

can be used to target new bone formation to fragile sites,” explains Poole, “and also because it might be possible to increase bone gains by including targeted exercises alongside PTH therapy.” Cortical thickness mapping could turn out to be an ideal tool for exploring the possible synergistic effect of PTH therapy and increased loading.

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Original article Poole, K. E. S. *et al.* Targeted regeneration of bone in the osteoporotic human femur. *PLoS ONE* 6, e16190 (2011)