Measurement of Cortical Bone Density in the Radius by Peripheral Quantitative Computed Tomography in Hemodialysis Patients

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Dear Sir,

In the uremic patients who develop secondary hyperparathyroidism, bone loss in the cortex would be more remarkable than in the trabecular bone, which may increase in some patients [1]. Since bone mineral density (BMD) of the lumbar spine determined by dual-energy X-ray absorptiometry does not help us evaluate the severity of the renal osteodystrophy, we used peripheral quanti-

tative computed tomography (pQCT), which can separately determine cortical BMD and trabecular BMD of the radius, to examine the clinical importance of the measurement of the cortical BMD in hemodialysis patients.

Measurement of BMD was performed as reported before [2]. The device used was XCT-960 (Stratec-Norland, Germany and

USA). Trabecular BMD was measured at the ultradistal site of the radius (at 4% of the length of the bone from the distal end). A more proximal site at 15% with abundant cortical bone was selected to measure cortical BMD. After a transsectional slice of the radius with 2.5 mm thickness had been obtained, 55% of the total bone area was removed from the periosteal surface, to peel

Fig. 1. Correlation of the cortical BMD to the duration of hemodialysis (a) and to the PTH concentration (b). Male patients aged from 50 to 65 years, who had been treated by hemodialysis for various periods, were selected. The cortical BMD was measured at the distal radius by pQCT, and the serum PTH concentration was determined by a mid-region assay. Inset: the trabecular BMD was also measured at the ultradistal radius in the same patients.

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off the cortex and 'subcortical area', leaving the pure trabecular bone for measurement. On the other hand, the cortex was defined as the area with the linear attenuation coefficient [linear attenuation coefficient = (BMD [mg/cm³] + 224)/ 982.723] higher than 0.93.

As shown in figure 1, the cortical BMD was inversely correlated with the duration of hemodialysis treatment and also to the parathyroid hormone (PTH) concentration. In contrast, the trabecular BMD did not correlate with either duration of the treatment or PTH. These results clearly demonstrate the differential bone changes in uremic patients. We conclude that focussing on the cortical bone loss, which may result in fractures, is quite important in the care of 2 uremic patients who are developing renal osteodystrophy.

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