Trabecular bone structure obtained from multislice spiral computed tomography of the calcaneus predicts osteoporotic vertebral deformities.

PURPOSE: To compare multislice computed tomography (MSCT)-derived parameters of the trabecular bone structure of the calcaneus with bone mineral density (BMD) in their ability to differentiate between donors with and without osteoporotic fractures of the spine and to optimize CT scan protocols.

METHODS: Forty-two postmortem calcanei (81.2 +/- 10 years) were imaged with a 16-detector row MSCT system using 4 different scan protocols varying spatial resolution (12-24 lp/cm) and radiation dose. Structural parameters of trabecular bone were derived from these images, and BMDs of the calcanei were determined using dual x-ray absorptiometry. Vertebral deformities of the spine were radiographically classified using the Spinal Fracture Index. Diagnostic performance in differentiation between donors with and without vertebral fractures was assessed using receiver operating characteristic (ROC) analysis.

RESULTS: There were significant case-control differences for many of the structural parameters measured (P<0.05). The highest ROC values were found for apparent trabecular thickness using the high-resolution and high-dose protocols. Statistically significant correlations were found between most structure parameters and BMD (up to r = 0.85, P<0.01).

CONCLUSION: Structural parameters of trabecular bone as obtained from
high-resolution MSCT images of the calcaneus can be used to differentiate between donors with and without osteoporotic vertebral fractures, using a high-resolution and high-dose CT protocol.