

Reliability and Validity of Lower Extremity Computed Tomography as a Screening Tool for Osteoporosis

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Introduction/Purpose: Although previous studies have demonstrated the potential of conventional computed tomography (CT) as a screening tool for osteoporosis, the assessment correlation of BMD in those studies was limited to the spine. This study aimed to evaluate the reliability and validity of CT as a screening tool for osteoporosis and to estimate the correlation between central BMD and peripheral bone attenuation using lower extremity CT.

Methods: In total, 292 patients who underwent a lower extremity, lumbar spine, or abdomen and pelvic CT scan within a 3-month interval of a dual-energy X-ray absorptiometry (DEXA) examination were included (Fig 1). Following reliability testing, bone attenuation of the L1, L2, L3, L4, femoral head, femoral neck, greater trochanter, distal femur, proximal tibia, distal tibia, and talus was measured by placing a circular region of interest on the central part of each bony region on a coronal CT image (Fig 2 and 3). Partial correlation was used to assess the correlation between CT and DEXA, after adjusting for age and body mass index.

Results: In terms of reliability, all bone attenuation measurements, except the femoral neck, showed good to excellent interobserver reliability (intraclass correlation coefficients, 0.691–0.941). In terms of validity, bone attenuation of the L1 to L4, femoral neck, and greater trochanter on CT showed significant correlations with BMD of each area on DEXA (correlation coefficients, 0.399–0.613). Bone attenuation of the distal tibia and talus on CT showed significant correlations with BMD of all parts on DEXA (correlation coefficients, 0.493–0.581 for distal tibia, 0.396–0.579 for talus).

Conclusion: Lower extremity CT is a useful screening tool for osteoporosis, and peripheral bone attenuation on lower extremity CT adequately reflects central BMD on DEXA.