Detection of osteoporotic vertebral fractures using multidetector CT.

INTRODUCTION: Goals were to compare the performance of lateral radiographs and sagittal reformations (SR) of axial computed tomography (CT) datasets in identification of osteoporotic vertebral fractures and to assess for optimal slice thickness in axial CT datasets needed for reliable classification of these fractures.

METHODS: Sixty-five vertebrae were harvested from 21 human cadaver spines and examined with a 64-row multidetector CT scanner. Axial images were acquired with a slice thickness of 0.6, 1, 2, 3 and 5 mm and SR were obtained using these datasets. In addition, specimens were radiographed in antero-posterior and lateral orientation. Vertebrae visualized in the different image datasets were separately graded by four radiologists according to the spinal fracture index (SFI) classification. Fracture status determined in a consensus reading of interactive reformations of the 0.6-mm CT dataset in all three dimensions served as a standard of reference in combination with pathological examinations. RESULTS: The average agreement for the 0.6-mm SR obtained between each radiologist and standard of reference for the grading of the fractures was very good (kappa=0.81). It was good for the 1-, 2- and 3-mm SR (kappa=0.70, 0.69 and 0.64), but only moderate for the radiographs (kappa=0.52), and fair for the 5-mm SR (kappa=0.33). When focusing only on detection of fractures, independent of the grading, all kappa
values improved by about 0.15, resulting in excellent values for the 0.6-mm through 3-mm SR (0.95