Introduction
Osteoporotic fractures should be prevented rather than treated. This requires an accurate diagnosis of bone strength, which should take bone micro-architecture into account. Therefore, imaging methods are required that can resolve trabecular architecture in vivo at the hip and spine. Recently, high-resolution flat-panel fluoroscopy with CT applicability has been developed. The main goal of this study is to assess the potential of this device, XperCT (Philips Healthcare), to visualize trabecular bone.

Materials and methods
Human proximal femurs, cervical and thoracic vertebrae were scanned with a high-resolution XperCT prototype (voxel size: 140 µm, Fig. 1) and with a microCT (voxel size: 37 µm). XperCT scans were carried out with and without a thorax phantom to test the potential for in vivo scanning (Fig. 2). Bone structural parameters and micro-FE calculated stiffness were quantified. The effects of a Laplace-Hamming (LH) and unsharpen (US) filter was studied as well.

Results
Comparing corresponding cross-sections showed that without the thorax phantom, image quality was good and trabecular structure could easily be recognized and quantified with XperCT (Fig. 3, table 1).

It was found that determination of structural and mechanical parameters was inaccurate when no filtering was applied, but filtering led to great improvement of these predictions in some parameters. Scanning bones within the phantom reduced image quality noticeably (Fig. 4). Analysis of these scans is currently underway.

Discussion and conclusion
Results demonstrate that the resolution of the system is sufficient to accurately determine some structural parameters. For in-vivo scanning conditions, however, more sophisticated filtering or noise-reducing protocols might be necessary. The near future will demonstrated if XperCT can live up to its expectations and will perform equally well in in vivo situations like the lower spine and hip, which are the clinically important sites in osteoporosis.