High-resolution imaging techniques for the assessment of osteoporosis.

The importance of assessing the bone's microarchitectural make-up in addition to its mineral density in the context of osteoporosis has been emphasized in several publications. The high spatial resolution required to resolve the bone's microstructure in a clinically feasible scan time is challenging. At present, the best suited modalities meeting these requirements in vivo are high-resolution peripheral quantitative imaging (HR-pQCT) and magnetic resonance imaging (MRI). Whereas HR-pQCT is limited to peripheral skeleton regions like the wrist and ankle, MRI can also image other sites like the proximal femur but usually with lower spatial resolution. In addition, multidetector computed tomography has been used for high-resolution imaging of trabecular bone structure; however, the radiation dose is a limiting factor. This article provides an overview of the different modalities, technical requirements, and recent developments in this emerging field. Details regarding imaging protocols as well as image postprocessing methods for bone structure quantification are discussed.