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Title:Comparison of optical coherence tomography, microcomputed tomography, and histology at a three-dimensionally imaged trabecular bone sample

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Abstract: We investigate optical coherence tomography (OCT) as a method for imaging bone. The OCT images are compared directly to those of the standard methods of bone histology and microcomputed tomography (uCT) on a single, fixed human femoral trabecular bone sample. An advantage of OCT over bone histology is its noninvasive nature. OCT also images the lamellar structure of trabeculae at slightly higher contrast than normal bone histology. While uCT visualizes the trabecular framework of the whole sample, OCT can image additionally cells with a penetration depth limited approximately to 1 mm. The most significant advantage of OCT, however, is the absence of toxic effects (no ionizing radiation), i.e., continuous images may be made and individual cell tracking may be performed. The penetration depth of OCT, however, limits its use to small animal models and small bone organ cultures.

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