Quantification of arthritic bone degradation by analysis of 3D micro-computed tomography data.

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Details

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Abstract

The use of animal models of arthritis is a key component in the evaluation of therapeutic strategies against the human disease rheumatoid arthritis (RA). We here present quantitative measurements of bone degradation caused by glucose-6-phosphate isomerase (G6PI) peptide induced arthritis based on the cortical bone profile. The use of micro-computed tomography (mCT) during three arthritis experiments and one control experiment allowed imaging of the metatarsals of hind paws and investigation of the effect of experimental arthritis on their cortical bone profile. For

measurements of the cortical profile we automatically identified slices that are orthogonal to individual metatarsals, thereby making the measurements independent of animal placement in the scanner. We measured the average cortical thickness index (CTI) of the metatarsals and also how the thickness changes along the metatarsal. In this study we introduce the cortical thickness gradient (CTG) and investigated how arthritis affects this measure. We found that generally both CTI and CTG are able to quantify arthritic progression with CTG being the more sensitive measure.

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