

Differences between subchondral and trabecular bone microporosities beneath the bone-cartilage interface at the knee joint



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laura.muller@uliege.be

L Müller¹, A Tits¹, E Plougonven², P Drion³, E Dall'Ara⁴, HG van Lenthe⁵, D Ruffoni¹

¹ Mechanics of Biological and Bioinspired Materials Laboratory, ULiège, BE - ² Chemical Engineering Department, ULiège, BE - ³ Experimental Surgery Unit, GIGA and Credec, ULiège, BE - ⁴ Department of Oncology and Metabolism, University of Sheffield, UK - ⁵ Department of Mechanical Engineering, KULeuven, BE

Introduction

Articular joints are complex structures integrating two strongly dissimilar tissues: the **hard bone** and the **soft cartilage**. Our objective is to characterize the <u>spatial evolution of the microstructure of trabecular bone as it approaches articular cartilage</u> in order to identify specific microstructural features to facilitate force transmission. We also investigate the microstructural interplay between mineralized cartilage and subchondral bone, both tissues being involved in cartilage degeneration.



GLOBAL ANALYSIS

2 mm side cube

Trabecular bone in the SUB region **denser**, with **thicker trabeculae** and less **anisotropic** (3x) than in the META region (p < 0.05)

GLOBAL ANALYSIS

- Trabeculae from the SUB region **thicker** with a more **heterogeneous** distribution than in the META region
- Conversely, no differences seen in the frequency distributions of trabecular

LOCAL CUBES ANALYSIS

Decrease in BV/TV in the Z direction, mainly due to an increase in trabecular separation, with thickness remaining practically constant
Lateral region denser, with thicker trabeculae than the medial region

separation

Future perspectives



Mineralized cartilage

Subchondral bone

Ongoing work focuses on characterizing microporosity at a **higher resolution** (1 μ m) to quantify the shape and spatial organization of <u>osteocyte</u> and <u>chondrocyte</u> lacunae in bone and mineralized articular cartilage respectively, comparing **healthy** and **aged** samples.

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80 µm









