

MICROSCOPIC OBSERVATIONS OF HUMAN VETEBRAL ENDPLATE

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Key words: *Intervertebral endplate, Reflection Light Microscopy, Transmission Light Microscopy, Micro-damage, Aging.*

Focal damage such as cartilaginous defects, erosions, micro-fractures, Schmorl nodes and thinning in the human vertebral endplate are thought to contribute to intervertebral disc degeneration by compromising the nutrition transport between the vertebral bone marrow and the disc nucleus pulposus. However, micro-fractures in the endplate are currently not detectable by conventional clinical radiographic methods. Nonetheless high quality visualisation of the human endplate is possible by means of advanced light microscopy and appropriate staining. The objective of this study focuses on efficient and inexpensive multi-scale protocols to prepare the surfaces of human endplate specimens for morphometric characterisations at the tissue and at the cell levels. Human vertebral endplate surfaces were observed under reflected and transmission light microscopy in the coronal, sagittal and transverse orientations. The observations were coupled to the relevant histological staining procedures for undecalcified and decalcified tissue samples to identify the following three regions: the intervertebral disc, the intervertebral cartilaginous and bony endplate [1], the subchondral and trabecular bone. At the tissue level, qualitative tissue identification based on relative stiffness was performed by nanoindentation. The mean±SD intervertebral endplate thickness was found to be $432.9\pm 89.3\ \mu\text{m}$ [2]. At the cell level, a Fast Fourier Transform algorithm made it also possible to measure the orientation of chondrocytes in the cartilaginous endplate and provide an insight on the link between the cell orientation and the load there are subjected to.

REFERENCES

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