

Ultrastructural modifications of human meniscus under different conditions

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Human meniscus presents two cell populations [1]. The main cell type present in its inner and middle part is the fibrochondrocyte, a round or oval shaped cell, while in outer zone fibroblast-like cells within a dense connective tissue [2] are mostly observable.

The aim of this work is to study a variety of pathological conditions. We have analyzed samples of meniscus obtained from 3 multiorgan donors (63 median age, years), 5 patients with traumatic meniscal tear (40 median age, years) and from 3 patients undergoing total knee replacement for osteoarthritis (OA) (73 median age, years).

In elderly menisci we observed a progression of chromatin margination, and a partial cytoplasmic organelle conservation, but for the presence of occasional autophagic vacuoles. Both after trauma and in OA, an increasing chromatin condensation, organelle degeneration and cytoplasmic vacuolization appear.

In OA, similarly to elderly, autophagic vacuoles, which probably represent a cellular self-protection mechanism, appeared in the cytoplasm. The most evident ultrastructural changes have been observed when intervention takes place long time after trauma. In this case a high chromatin condensation, a large cytoplasmic vacuolization with degeneration of organelles and several necrotic cells appear.

Calcification areas occur in all conditions. In particular, specimens from traumatic menisci have a structure similar to OA ones, especially if trauma has not been surgically repaired

at appropriate times. In all there is disorganization of collagen fibers, and their replacement with proteoglycans.

We can conclude that trauma and OA induce an increasing meniscal degeneration, comparable to physiological aging. When surgery takes place long time after trauma we observed most evident menisci degeneration. In all pathological conditions apoptotic like features appeared [3].

References

[1] Van der Bracht et al., 2007.

[2] Danso et al., *Journal of the mechanical behavior of biomedical materials*, 67 (2017) 51–60.

[1] Battistelli et al., *Apoptosis*, 2014.

Keywords

Human Meniscus, Transmission Electron Microscopy, Elderly, Trauma, OA