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In vitro assessment of a novel composite scaffold for articular cartilage restoration

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Articular cartilage (AC) lesions are a particular challenge for regenerative medicine due to cartilage low self-ability repair in case of damage. Hence, a significant goal of musculoskeletal tissue engineering is the development of suitable structures in virtue of their matrix composition and biomechanical properties [1]. The objective of our study was to design *in vitro* a supporting structure for cartilage chondrocytes to treat focal articular joint defects. We realized a bio-hybrid composite scaffold combining decellularized Wharton's jelly (W's J) with the biomechanical properties of the synthetic hydrogel polyvinyl alcohol (PVA). The hydrogel itself and the more specific decellularized cartilage matrix were used as controls. Immunohistochemical analysis highlighted a similar histomorphology for W's J and AC matrices. Human chondrocytes were isolated from articular cartilage by collagenase II digestion and then characterized by flow-cytometry and RT-PCR to assess the expression of specific markers. $CD44^+/CD73^+/CD151^+$ chondrocytes were seeded on PVA, PVA/AC and PVA/W's J scaffolds to test their ability to support cell colonization. According to SEM micrographs and MTT proliferation assay, PVA/W's J revealed a singular attitude to sustain cell proliferation despite its aspecific origin. Our preliminary evidences highlighted the chance of using Wharton's jelly in combination with PVA hydrogels as an innovative and easily available scaffold for cartilage restoration.

References

[1] Kreuz et al., (2013) Scaffold-assisted cartilage tissue engineering using infant chondrocytes from human hip cartilage. Osteoarthritis Cartilage 21(12):1997-2005.
http://www.ncbi.nlm.nih.gov/pubmed?term=Kreuz%20PC%5BAuthor%5D&cauthor=true&cauthor_uid=24096178.

Keywords

Polyvinyl alcohol, composite scaffolds, Wharton's jelly, cartilage, extracellular matrix, chondrocytes.