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Production of calcium crystals by chondrocytes in osteoarthritic knees

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In enchondral ossification, hypertrophic chondrocytes are specialized to remodel and mineralize the extracellular matrix (ECM). Chondrocyte hypertrophy occurs pathologically in OA and previous data suggest that the formation of different calcium crystals and their deposition in the cartilage matrix is part of the disease process. However, the exact mechanisms by which the formation of these crystals of their generation is linked to altered chrondocyte differentiation and to the pathogenesis of OA remain incompletely understood. Here, we sought to analyse systematically the prevalence and composition of calcium crystals in endstage knee OA of 120 patients as well as their relation to clinical disease score and histological changes. In addition, we investigated the expression of the different genes, known to be involved in matrix calcification, like ENPP1, ANK and TNAP in cultured chondrocytes of these patients and analyzed their potential to calcify ECM in vitro.

We demonstrated mineralisation in cartilage specimens from all 120 patients. The size of calcified area showed a significant inverse correlation with the clinical knee score, and even more importantly a clear correlation also with the histological changes. FESEM analysis identified apatite or precursors of apatite minerals in all probes. All OA chondrocyte cultures showed a significant mineralisation capacity, while no mineralisation was seen with chondrocytes from healthy controls. In line with our in vivo findings, the minerals found in vitro were apatite or precursors of apatite, and no CPPD crystals were found. The extend of mineralisation of the cultures and the cartilage probes correlated with the expression of the hypertrophy marker collagen X. A differential regulation of the matrix calcification related gene ENPP1 was found.

Our data demonstrate that mineralisation of articular cartilage is a regular event in end-stage OA that shows a strong correlation both with clinical symptoms and histological changes. As suggested by the nature of the crystals, the correlation to hypertrophy markes and in vitro calcification as well as the association with calcification related genes such as ENPP1, calcification of articular cartilage in OA is linked to mechanisms of enchondral ossification and may be an important part of the pathogenesis of the disease.

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Tissue engineering and stem cells, applied for treatment of Rheumatology diseases. From experiments to modeling and to the clinical medicine

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Rheumatology diseases (for example-degenerative or rheumatoid arthritis) are accompanied by join destruction. Tissue engineering technology, like "antologous chondrocyte implantation, matrix-assisted chondrocyte implantation, or in situ recruitment of bone marrow mesanchymal stem cells (MSCs) target the treatment of traumatic defects or of early osteoarthritis" has been discussed recently. The aim of the work, presented could be mention as an attempt for analysis, generalization and discussion on recent research in field of tissue engineering developments, methods for therapy of rheumatology disorders, implantations, MSCs, for joint tissue engineering, principal and clinical applications of MSCs. MSCs, in vivo immune suppression, arthritis, and tissue engineering, including analysis on observations of major histocompablity complex (MHC), the mechanisms underlying the immunosuppressive effect, the characteristics and heir tissue formation potential make MSCs appropriate cells for tissue engineering in autoimmune diseases (AD) has been discussed. Tissue engineering (TE), has been defined as interdisciplinary field, combining biomaterials for drug delivery and providing technologies for alternative mechanisms and a significant contribution of drug delivery system (DDS). Some interesting facts, regarding osteoarthrits (OA), by effective treatment with techniques "that cause multipotent adult mesanhymal stem cells to differentiation into cells, led to variety of experimental strategies…"has been analyzed as well. Tissue engineering and stem cells show progressive trends for treatment of rheumatology disease.

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