

Effects of Extracorporeal Shock Waves on Chondrocytes From Osteoarthritic Human Subjects

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Objective:

A key role in the pathophysiology of articular cartilage is played by cell/extra-cellular matrix (ECM) interactions, which are mediated by cell surface integrins. In a physiologic setting, integrins modulate cell/ECM signaling, essential for regulating growth and differentiation and maintaining cartilage homeostasis. During OA, abnormal integrin expression alters cell/ECM signaling and modifies chondrocyte synthesis, with the following imbalance of destructive cytokines over regulatory factors. IL-1, TNF-alpha and other pro-catabolic cytokines activate the enzymatic degradation of cartilage matrix and are not counterbalanced by adequate synthesis of inhibitors (IGF, TGFb, IL-10).

We investigated the effects of extracorporeal shock waves on the expression of IL-10, TNF α , b1 integrins (CD29) on chondrocytes from osteoarthritic human subjects.

Methods:

Articular cartilage was obtained from 9 patients with osteoarthritis (OA) undergoing surgical knee replacement. Chondrocytes were isolated by enzymatic digestion from articular cartilage. Chondrocytes of Group A were treated with ESWT with an electromagnetic lithotripter (MINILITH SL1 by STORZ MEDICAL) by selecting two different energy levels (0,055 - 0,17 mJ/mm²) and two total impulses (500, 1000) for each level. The Control Group (B) received no shock wave treatment but was maintained with the device off for the same time. The cells from each group (A, B) were cultivated (37°C, 5% CO₂) for 48 hours. The biological activity and viability were evaluated at 24 and 48 hours after treatment. Cytokines expression were carried out by flow-cytometry.

Result:

Significant reduction in IL-10 and TNF α expression were found in Group A as compared to controls; this effect was seen in cultures receiving the highest energy treatments. No significant differences were found in b1 integrins (CD29) expression.

Conclusion:

Our preliminary investigation revealed that extracorporeal shock wave treatment at lowest energy level does not cause cytotoxicity to human chondrocytes. On the other hand, the lowest level appeared to significantly reduce the catabolic parameter. Further evaluation of the effect of ESWT on chondrocytes is indicated.