Cartilage, synovium and bone

AB0086 TYPE II COLLAGEN AND GLYCOSAMINOGLYCAN TURNOVER IN BOVINE ARTICULAR CARTILAGE IS MODULATED BY LONG-TERM DYNAMIC COMPRESSION

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Background: Osteoarthritis (OA) patients suffer from progressive degradation of articular cartilage, to which there is no available treatment to block or reverse the catabolic mechanisms. Articular cartilage confers a biomechanical function in the joints, and in concordance chondrocytes have shown to be mechanosensitive. The effect of dynamic compression on cartilage extracellular matrix (ECM) could prove to be crucial for translational research in development and screening of new OA drug candidates.

Objectives: This study investigates the effect of long-term dynamic compression of a bovine articular cartilage ex vivo model through quantification of cartilage associated biomarkers.

Methods: Full depth bovine cartilage explants were cultured for 2 weeks. The explants were treated 3 times a week with either OSM [10 ng/mL] and TNF-α [2 ng/mL] (O+T), or TGF-B1 [50 ng/mL]. Untreated samples were included as negative controls (w/o). For each condition two groups were established; an unloaded group and a group compressed 3 times a week. Compression was applied using Electroforce 5500 (TA Instruments), in a sine wave with a maximum load per cycle of 1 MPa, at 1 Hz frequency for 1200 cycles. Metabolic activity was measured once a week using AlamarBlue. Biomarkers released to the supernatant were assessed using the following well-described ELISAs: formation of type II collagen was measured by ProC2, and MMP-degradation of type II collagen was measured by C2M. Sulfated glycosaminoglycans (sGAG) released in media, and sGAG extracted from the explants on the last day was measured using a 1,9-dimethylmethylene blue (DBM) assay.

Conclusions: Compression significantly reduced the degradation of type II collagen, which in combination with unaltered formation as measured by ProC2, may suggest suppression of the involved catabolic processes and increased deposition of type II collagen in the cartilage matrix. Furthermore, compression elevated the sGAG release without reduction in the explant GAG content, indicating an increased turnover of GAG. In conclusion, the cartilage ECM turnover is significantly modulated by dynamic compression. This method adds essential translational value to the continuous research addressing OA.

Disclosure of Interest: None declared