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Non invasive moderate loading in vivo and osteoarthritis development

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Mechanical loading is known to modify joint structure through a mechano-adaptative response and to increase proinflammatory cytokines, as IL-1β, modulating VEGF secretion by condrocytes1. VEGF is a potent angiogenic factor, also detectable in later stages of OA, able to increase matrix MMPs playing an important role in the development of OA2. The aim of this study is to evaluate "in vivo" changes of bone and cartilage leading to OA by means of nonsurgical intermittent moderate loading. Forty day-old mice was randomly divided into two groups of six animals each: sedentary and exercised. The exercised group was subjected to a treadmill running at 12m/min, two times a week for four weeks. The sedentary group did not undergo any physical training and was left free to walk inside the cages. After the sacrifice the femur heads were removed and processed for paraffin embedding. On 5μm coronal sections, safranine-O staining and immunostaining for IL-1 β, MMP-13 and VEGF was performed to evaluate: articular cartilage and subchondral bone trabeculae thickness; chondrocytes number/mm2; chondrocytes volume; % cell number expressing VEGF, IL-1β and MMP-13 in articular cartilage and bone. Significant increase of chondrocytes volume, VEGF and MMP-13 expression in cartilage was detected. These data seem indicate that our non-invasive experimental model could induce early alterations in articular cartilage only, confirming chondrocytes to play a central role in the pathogenesis of OA. Other alterations, such as articular cartilage cracking and thickening and sub-chondral bone sclerosis, would appear later.

References

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