

The response of healthy femoral head to a moderate mechanical loading. Preliminary results

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It is well-known that most of the degenerative processes of the skeletal system are induced by an altered mechanical load. Osteoarthritis, a chronic degenerative disease affecting the synovial joints, is a typical example of pathology influenced by mechanical stimuli that occurs with the degradation of articular cartilage, osteophytes formation, sub-chondral bone and calcified cartilage thickening and leukocyte infiltration in the synovial membrane. It is still not clear whether degenerative processes of joint tissues occur simultaneously or follow a well-defined sequence of events. To better evaluate the involvement of the articular cartilage, bone and calcified cartilage, we have analysed early stage changes in the femur proximal end of mice subjected to moderate mechanical loading. Twelve mice (C57BL) 4-5 weeks old were casually subdivided into two groups: "exercised" and "sedentary". The first group was underwent 30 min of running on an horizontal treadmill (Columbus Instruments,USA) at 12 m/min, twice a week, for 4 weeks, whereas the second one was left free to move in the cage without additional muscle work. After sacrifice, femurs were fixed in 4% paraformaldehyde in 0,1 M PBS and embedded in paraffin wax. Five micrometers frontal sections, were deparaffinized and rehydrated in a xylene-graded alcohol scale. On Safranin-O stained sections, morphometrical analysis was carried out by means of Nikon NIS-elements Br software to evaluate a) the number and the volume of the chondrocytes. b) the sub-chondral bone volume, c) the thickness of trabecular bone and d) the thickness of calcified cartilage zone. The exercised mice do not show any variation at level of the bone and calcified cartilage. On the contrary, it seems that the articular cartilage, despite not showing any signs of degeneration, as altered staining or obvious injuries, reacts by increasing the volume of its chondrocytes ($p < 0,05$). These preliminary data seem to confirm the existence of a sequence of events where articular cartilage responds to increased mechanical loading more promptly than bone and calcified cartilage.

Key words

Mechanical loading, running, osteoarthritis, articular cartilage