



Effect of pulsed electromagnetic field stimulation on knee cartilage, subchondral and epiphyseal trabecular bone of aged Dunkin Hartley guinea pigs

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Abstract

It has been demonstrated that pulsed electromagnetic field (PEMF) stimulation has a chondroprotective effect on osteoarthritis (OA) progression in the knee joints of the 12-month-old guinea pigs. The aim of the present study was to discover whether the therapeutic efficacy of PEMFs was maintained in older animals also in more severe OA lesions.

PEMFs were administered daily (6 h/day for 6 months) to 15-month-old guinea pigs. The knee joints (medial and lateral tibial plateaus, medial and lateral femoral condyles) were evaluated by means of a histological/histochemical Mankin modified by Carlsson grading score and histomorphometric measurements of cartilage thickness (CT), fibrillation index (FI), subchondral bone thickness (SBT) and epiphyseal bone microarchitecture (bone volume: BV/TV; trabecular thickness: Tb.Th; trabecular number: Tb.N; trabecular separation: Tb.SP). Periarticular knee bone was also evaluated with dual X-ray absorptiometry (DXA). PEMF stimulation significantly changed the progression of OA lesions in all examined knee areas. In the most affected area of the knee joint (medial tibial plateau), significant lower histochemical score ($p < 0.0005$), FI ($p < 0.005$), SBT ($p < 0.05$), BV/TV ($p < 0.0005$), Tb.Th ($p < 0.05$) and Tb.N ($p < 0.05$) were observed while CT ($p < 0.05$) and Tb.Sp ($p < 0.0005$) were significantly higher than in SHAM-treated animals. DXA confirmed the significantly higher bone density in SHAM-treated animals. Even in the presence of severe OA lesions PEMFs maintained a significant efficacy in reducing lesion progression.