

# Medical PEMF Studies



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## PAIN

### Conservative treatment of spontaneous osteonecrosis of the knee in the early stage: pulsed electromagnetic fields therapy.



1. Eur J Radiol. 2013 Mar;82(3):530-7. doi: 10.1016/j.ejrad.2012.11.011. Epub 2012 Dec 3.

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#### **BACKGROUND:**

**HYPOTHESIS:** pulsed electromagnetic fields treatment might improve symptoms in the early stage of spontaneous osteonecrosis of the knee.

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**METHODS:** Twenty-eight patients (19M/9F, age  $49.8 \pm 16.4$  years) suffering from symptomatic (pain) Koshino stage I spontaneous osteonecrosis of the knee, confirmed by magnetic resonance imaging (MRI) were treated with local pulsed electromagnetic fields therapy (6 h daily for 90 days). Clinical evaluation: baseline, 6- and 24-month follow-up by VAS for pain, knee society score (KSS), Tegner and EQ-5D scales. MRI evaluation: baseline and 6-month follow-up, measuring bone marrow lesion's areas and grading these lesions by WORMS score. Failures: patients undergoing knee arthroplasty.

**RESULTS:** Pain significantly reduced at 6 months (from  $73.2 \pm 20.7$  to  $29.6 \pm 21.3$ ,  $p < 0.0001$ ), which remained almost unchanged at final follow-up ( $27.0 \pm 25.1$ ). KSS significantly increased in first 6 months (from  $34.0 \pm 13.3$  to  $76.1 \pm 15.9$ ,  $p < 0.0001$ ) and was slightly reduced at final follow-up ( $72.5 \pm 13.5$ ,  $p = 0.0044$ ). Tegner median level increased from baseline to 6-month follow-up (1(1-1) and 3(3-4), respectively,  $p < 0.0001$ ) and remained stable. EQ-5D improved significantly throughout the 24 months ( $0.32 \pm 0.33$ , baseline;  $0.74 \pm 0.23$ , 6-month follow-up ( $p < 0.0001$ );  $0.86 \pm 0.15$ , 24-month follow-up ( $p = 0.0071$ )). MRI evaluation: significant reduction of total WORMS mean score ( $p < 0.0001$ ) and mean femoral bone marrow lesion's area ( $p < 0.05$ ). This area reduction was present in 85% and was correlated to WORMS grading both for femur, tibia and total joint ( $p < 0.05$ ). Four failures (14.3%) at 24-month follow-up.

**CONCLUSIONS:** Pulsed electromagnetic fields stimulation significantly reduced knee pain and necrosis area in Koshino stage I spontaneous osteonecrosis of the knee already in the first 6 months, preserving 86% of knees from prosthetic surgery at 24-month follow-up. No correlation was found between MRI and clinical scores.

**LEVEL OF EVIDENCE:** Level IV; case series.

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