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Effectiveness of frequency-modulated electromagnetic neural stimulation (FREMS) in the treatment of the acute phase of Charcot´s neuro-arthropathy (DNOAP)

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Introduction: Recently FREMS has been successfully applied to the treatment of painful diabetic neuropathy (Bosi et al. Diabetologia 48: 817 – 23, 2005). Since one of the proposed mechanisms of action was related to the modulation of the inflammation, we tested this technology in the acute phase of DNOAP.

Patients, Materials and Methods: We retrospectively randomized 10 diabetic patients presenting with an acute DNOAP, diagnosed according to the presence of at least three symptoms and a difference in skin temperature >3°C between the two foot, into two groups: both received our standard treatment consistent in non-weight bearing Aircast walker, associated with the application of FREMS in one group [Group A] while the other one receive a sham application [Group B]. Both Groups double-blindly received 20 daily applications in two sessions separated by one-week interval. We evaluated both physical [circonference of the foot at the dorsum (CFD) and at the ankle (CFA), difference in skin temperature between the feet (ΔT)], biochemical [COOH-Telopeptide of Pro-collagen (TPP), Bone Alkaline Phosphatase (BAP) and Osteocalcin (OSC)] and instrumental [difference in the captation of gadolinium at MR imaging (ΔG)] at baseline and after one month. We recorded also adverse events and symptoms.

Results: Both group reported a reduction of sympoms and no adverse event were recorded throughout the study. Group A patients showed a significant ($p<0.01$) difference of both CFD (2.1±0.9 vs 6.0±1.4 cm), CFA (3.3±2.2 vs 6.8±5.7 cm) and ΔT (1.1±0.4 vs 4.1±2.2 °C) compared to Group B. No difference was observed in TPP, BAP and OSC between the two Groups, while ΔG was significantly ($p<0.01$) reduced in Group A compared to group B (-142±51% vs -17±22%).

Conclusions: This short-term pilot study showed encouraging results for the application of FREMS in the acute phase of DNOAP, associated to immobilization and weight relief. Further longitudilnal and more dimensioned studies will be necessary to evaluate the potential beneficial effect of FREMS in the management of DNOAP in clinical conditions.