

An innovative therapy for peri-implantitis based on radio frequency electric current : numerical simulation results and clinical evidence.

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Abstract

Peri-implantitis is a severe inflammatory pathology that affects soft and hard tissues surrounding dental implants. Nowadays, only prevention is effective to contrast peri-implantitis, but, in recent years, there is the clinical evidence of the efficiency of a therapy based on the application of radio frequency electric current, reporting that 81% of the cases (66 implants, 46 patients) were successfully treated. The aim of this paper is to present the therapy mechanism, exploring the distribution of the electric currents in normal and pathologic tissues. A 3D numerical FEM model of tooth root with a dental implant screwed in the alveolar bone has been realized and the therapy has been simulated in COMSOL Multiphysics® environment. Results show that the electric current is focused in the inflamed zone around the implant, due to the fact that its conductivity is higher than the healthy tissue one. Moreover, by means of a movable return electrode, the electric current and field lines can be guided in the most inflamed area, limiting the interference on healthy tissues and improving the therapy in the area of interest. In conclusion, it can be stated that this innovative therapy would make a personalized therapy for peri-implantitis possible, also through impedance measurements, allowing the clinician to evaluate the tissue inflammation state.