

Recombinant osteoprotegerin effects during orthodontic movement in a rat model

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Background and objectives: Anchorage is one of the most challenging sides in orthodontics. The use of biological modulators that inhibit osteoclasts could be a solution to address these problems and provide new adjunctive approaches. The aim of this study was to assess the effectiveness of recombinant osteoprotegerin fusion protein (OPG-Fc) in orthodontic anchorage. **Materials and methods:** Two groups of male Sprague-Dawley rats were utilized. The animals in the experimental group received twice-weekly injections with high dose of OPG-Fc (5.0mg/kg) in mesial and distal mucosa of the first molars, and those in the control group received no drugs. Right first maxillary molars were mesialized using a calibrated nickel-titanium spring connected to an anterior mini-screw. Tooth movement was measured by two blinded observers using scanned and magnified stone casts. Receptor activator of nuclear factor κ B (RANK), run-related transcription factor 2 (Runx2), type I collagen, vimentin, matrix metalloproteinases 2 and 9, S100 protein and the putative mechanoproteins acid-sensing ion channel (ASIC2) and transient receptor potential vanilloid 4 (TRPV4) were evaluated using immunohistochemistry. **Results:** OPG-Fc group showed an important decreased in mesial molar movement with only 52%, 31%, and 22% of the total mesial molar movement compared with control group at Days 7, 14, and 21, respectively ($P < 0.001$). RANK

ligand and Runx2 positive cells were severely reduced after OPG-Fc treatment. Periodontal ligament architecture, cell arrangement, and immunohistochemical pattern for vimentin, type I collagen and the mechanoproteins TRPV4 and ASIC2 were altered by tooth movement and all these parameters altered by the applied treatment. Conclusions: OPG-Fc effectively inhibits osteoclastogenesis resulting in improved bone quantity and orthodontic anchorage. Based on present results, OPG-Fc could have clinical utility in preventing undesired tooth movements. © 2015 The Author 2015. Published by Oxford University Press on behalf of the European Orthodontic Society. All rights reserved.