

Dr. Ali Hassan has completed his orthodontic residency and Ph.D. program. Thanks to AAOF he completed this work and the manuscript has been accepted for publication.

## THE USE OF BONE MORPHOGENETIC PROTEIN-2 AND DENTIN MATRIX PROTEIN-1 TO ENHANCE THE OSTEOINTEGRATION OF THE ONPLANT SYSTEM

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This study examined the possibility of enhancing the speed and effectiveness of osteointegration of onplants on rabbit calvarial bones by adding recombinant human bone morphogenetic protein-2 (rhBMP-2) and/or dentin matrix protein-1 (DMP-1). (accepted for publication, *Calcified Tissue Research*, 2002)

### ABSTRACT

Onplants™ are known to provide absolute anchorage for orthodontic tooth movement

in

humans if loaded after 3 to 4 months, and can be removed after use. The purpose of this study was to evaluate the speed and effectiveness of osteointegration of onplants treated with recombinant human bone morphogenetic protein-2 (rhBMP-2) and/ or dentin matrix protein-1 (DMP-1) in rabbits. Fifty- four onplants were placed on the calvaria of nine rabbits. Onplants were divided into four groups; rBMP-2, rDMP-1, BMP-2 +DMP-1 (B+D) and controls. The hydroxyapatite surface of each onplant was soaked in a solution of the assigned protein in each of the study groups or a phosphate buffer solution in the control group. Onplants were inserted into subperiosteal tunnels and allowed to heal for 6 weeks. After euthanizing the animals, bone blocks, each containing an onplant, were either prepared for histological examination or biomechanical characterization. Histological and histomorphometric results demonstrated significant bone formation at the bone-onplant interface in the BMP-2 and B+D groups when compared to DMP1 and the controls. Mechanically, onplants treated with BMP-2 withstood tensile forces ranging between 3.4 and 5.0 kg. Onplants treated with BMP-2 and DMP1 (B+D) withstood an average of 3 kg of pulling forces. On the other hand, onplants in the DMP1 and control groups withstood forces ranging between 0 kg to 1.3 kg. These results indicate a potential of enhancing the osteointegration of onplants for early loading.