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Analysis of tissue structure and remodeling ion alveolar ridges augmented with human palate or tuberosity mucosa

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Previous clinical reports found different clinical outcomes of localized alveolar ridge augmentation with soft tissue harvested either from the palate or from the tuberosity over time, showing that the palatal grafts had a better tissue stability than those from the tuberosity, which tended to a hyperplastic reaction. The mechanisms responsible for a different maturation of the grafted tissue using the two donor sites are still unclear, very likely depending on differences of the structure and extracellular matrix of connective tissue (CT). The current study aimed at comparing the morphology and collagen turnover-related molecular pathways of sites grafted with CT from either the palate (group A = 7 patients) or the tuberosity (group B = 7 patients) one year after surgical procedures for ridge augmentation. Cultured fibroblasts were obtained to analyze by real-time PCR the mRNA levels for collagen type I and III (COL-I, COL-III), matrix metalloproteinases (MMP-1 and 2), long lysyl hydroxylase 2b (LH2b). Collagen protein levels were assessed by slot blot, collagen degradation by SDS-zymography. No significant differences in collagen content were found. COL-I and III, MMP-1 and 2 expression was similar in cell culture supernatants from palate and tuberosity fibroblasts, although COL-I and COL-III protein levels resulted up-regulated, respectively, in 57% and 66% of the samples. LH2b/COL-I mRNA ratio 69% was higher in the tuberosity fibroblasts, suggesting that the tuberosity collagen could be cross-linked at a higher extent, and therefore less susceptible to degradation by MMPs, leading to its excessive accumulation. Our data show that in group B the higher LH2b/COL-I mRNA ratio may be responsible for differences in collagen maturation as the major determinants in the hyperplastic response, and that grafting using the maxillary tuberosity could avoid unwanted tissue contraction over time.

Key words
Collagen turnover, periodontal plastic surgery, maxillary tuberosity, autogenous graft.