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Tissue Integration and Vascularization of Peri-Implant Soft Tissue Grafts

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Objectives While peri-implant tissue health and thickness can be evaluated clinically, histological analyses are essential to prove graft integration with the surrounding tissues following soft tissue augmentation and may biologically explain clinical observations (dehiscence, shrinkage, swelling). The aim of this study was to histologically analyse tissue integration and vascularisation of volume collagen matrices (VCMX) and subepithelial connective tissue grafts (SCTG) at 3 and 4 months following peri-implant soft tissue augmentation.

Methods This is a secondary histological analysis of two previous randomized controlled trials [l-2]. investigating the efficacy of VCMX (Geistlich Fibro-Gide®, Geistlich Pharma) compared to autogenous SCTG at implant sites. Peri-implant soft tissue augmentation was performed with VCMX or SCTG and biopsies harvested at 3 and 4 months. Analyses included: descriptive histology, blood vessel count and tissue composition (remaining matrix, peri-implant connective tissue containing 3 different components (collagen bundles, elastic connective tissue and loose connective tissue), elastic fibres and background).

Results A total of 21 samples were analysed (VCMX: 6/9 biopsies at 3/4 months ; SCTG: 6 biopsies at 3 months). VCMX sites displayed less and smaller blood vessels within an overall denser tissue. The collagen bundles were thicker compared to SCTG sites, which overall also presented a looser structure (Fig.1). The percentages of elastic connective tissue were of 22.5% (VCMX/3m), 32,7% (VCMX/4m) and 17.4% (SCTG/3m). The VCMX/3 samples showed the highest proportion of elastic fibres (10,7%) (Fig.2). The buccal volume shrinkage between augmentation and follow-up at 3 or 4 months was greatest for VCMX at 4 months.

Conclusions Peri-implant soft tissue augmentation with VCMX resulted in a reduced vascularisation, but a greater tissue density compared to sites augmented with SCTG. The greater shrinkage observed with VCMX might be partly explained by the increased collagen and overall tissue density within the VCMX-augmented tissues.