Efficacy and safety of self-assembling peptide P11-4 in periodontal regeneration - An acute dehiscence model in dogs

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Background: Today’s treatment strategies for periodontitis comprise the removal of pathogenic biofilm in combination with regenerative surgical procedures employing animal-derived substances (EMD, bovine bone, etc.). These substances are not tolerated by all patients and thus, a fully synthetic device might be favored. Self-assembling peptides (SAPs) can be administered as liquids and subsequently form stable hydrogels. They have shown potential in various indications i.e. dental hard tissue regeneration.

Aim/Hypothesis: The purpose of this study was to evaluate the regenerative performance of a self-assembling peptide used for the treatment of acute buccal bone defects in dogs. In order to do so, the SAPs were compared to a negative control as well as to a positive control, EMD.

Material and Methods: Eight acute dehiscence defects were created in each of seven dogs. After intrasulcular incision and elevation of the flap, a bone defect of 3x5 mm at each distal root of P2-M1 was created (n = 56) with a bur. The cementum was carefully removed. The apical extension of each defect as well as the middle of the defect at crown level was marked with a notch. Four different treatments were randomly assigned- P11-4-SAP with PrefGel (T1) P11-4-SAP without PrefGel (T2) Sham (S) and EMD. Vertical new bone formation was assessed by micro-CT. Relative vertical bone fill (rVB) was calculated as (coronal bone_center.defect - notch) (coronal bone_adjacent.defect - notch)*100.

Results: After 4 weeks of healing T1 showed a median rVB of 81.7% (Q1 = 81.0%, Q3 = 88.0%) compared to 61.1% (Q1 = 53.6%, Q3 = 75.9%) for sham treated sites. The results for T2 (median = 75.9%, Q1 = 72.1%, Q3 = 83.5%) and EMD (median = 78.4%, Q1 = 70.2%, Q3 = 84.6%) were comparable to the T1 group.

Conclusions and Clinical Implications: Within the limitations of this proof-of-concept study, preliminary results of the bone defect fill suggest a regenerative potential of SAPs in the treatment of acute periodontal defects comparable to the gold standard EMD. Further analysis (different time points, histology) is ongoing to assess biocompatibility and tissue functionality. It can be speculated that SAPs could be used in periodontal surgery of intrabony defects to promote periodontal regeneration.