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Degree **:** Ph.D.

Title of Thesis: Evaluation of the Use of Mesenchymal Stem Cells in Periodontal Tissue Regeneration (Animal Study)

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Abstract :

The aim of the present study was to investigate the periodontal regenerative potential of gingival margin-derived mesenchymal stem/progenitor cells in an animal model. Periodontal defects were induced at six sites in eight miniature-pigs in the premolar/molar area. Autologous cells were isolated from the gingival margin of each animal, magnetically sorted using STRO-1 antibodies and characterized flow-cytometrically for the expression of CD14, CD31, CD34, CD45, CD117 and STRO-1. Colony-formation and multilineage differentiation potential were tested. The cells were expanded ex-vivo and loaded on BioOss®-(test-group-1)-and Collagen-(test-group-2)-scaffolds and transplanted into the animals, together with unloaded scaffolds (control-groups-1 and -2), sites receiving subgingival debridement (control-group-3) and non-treatment controls (control-group-4). Clinical attachment level (CAL), probing depth (PD), gingival recession (GR) and subtraction volumetric computed tomography (CT) examinations were performed at -4 weeks, baseline and 12 weeks. The histological attachment level (HAL) was evaluated after 12 weeks in each group. Results of this study revealed that cells were plastic-adherent, showed colony formation, were CD14-, CD34-, CD45-, CD31+, CD117+, STRO-1+ and could be differentiated into osteoblastic, adipocytic and chondroblastic directions. Test-group-1 and -2 showed considerable gains in CAL, PD, gingival height and HAL. A significant radiographic defect fill was observed in test -group-1 compared to control-group-4. In conclusion, mesenchymal stem/progenitor cells from the gingival cervical margin showed a significant potential in regenerative periodontal treatment.

Keywords:

Stem cells; Gingiva; Periodontitis; Regeneration.