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Biocompatibility of Resin-Matrix Ceramics (RMCs) on Human Gingival Fibroblasts.

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Objectives This project aims to investigate the influence of Resin-Matrix Ceramics (RMCs) restorative materials (like GC Cerasmart 270 and Katana Avencia), on primary human gingival fibroblasts (ATCC PCS-201-018) (HGF) to evaluate biocompatibility of dental materials as an in vitro experimental model.
Methods Disk-shaped samples with 15 mm diameter and 1 mm thickness were tested as received from manufacturers on HGF. HGFs reside in the subepithelial connective tissue in which play a crucial role in maintenance of tissue integrity, wound healing and regeneration process. To evaluate biocompatibility of RMC materials, the influence on proliferation of HGF was tested at 1,3 and 7 days with Alamar Blue assay, at the same time point the inflammation was analysed with ELISA (specifically detecting the inflammatory factor IL-1β) and to assess the effect of RMCs on wound healing, scratch migration assay at 24 h, 28 h and 72 h was performed. Data were analysed using one-way repeated measure ANOVA and Tukey's test.
Results Our data demonstrated that there was no significant difference in proliferation between HGFs in contact with disks and untreated control group (the cells were cultured on polystyrene plates in the absence of eluates) at each observed time point. Particularly, after 1 day, a growth inhibition of 2,2% was showed in GC Cerasmart 270 and 1,6% in Katana Avencia. At day 3, the percentage increased to 11,5% in GC Cerasmart 270 and 8,9% in Katana Avencia, while at day 7, the growth inhibition was 3,8% in GC Cerasmart 270 and 3,1% in Katana Avencia. Furthermore, there was no significant variance in the expression of IL-1β in treated cells compared to control group at each assessed time point, although a trend towards increase was noted at day 3 in both tested samples. Ultimately, the results from the scratch assay indicated that both materials did not exert any influence on the wound healing capacity.
Conclusions Biocompatibility is crucial for any dental material that may interact with vital tissues. This study aims to investigate biological effects of RMC restorative materials on HGF to evaluate, through in vitro experimental model, proliferation, inflammation and wound healing. Importantly, the results of our study give a considerable contribute to the implementation of restorative surgery.