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Effects of a new nanocomposite system on Human Gingival Fibroblasts/Streptococcus mitis co-culture

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In the broad field of biomaterials, Bisphenol A glycidylmethacrylate (BisGMA)/triethyleneglycol dimethacrylate (TEGDMA) thermosets are frequently used for dental restoration (Lehtinen et al 2008), but infections due to bacterial adhesion remain the main reason of dental devices failure. In order to avoid biofilm formation on the components used for restoration and to reduce cytotoxicity against eukaryotic cells, a new material with antimicrobial properties was developed. Indeed, silver nanoparticles (n-Ag), which have well-known antimicrobial properties, were stabilized with a polyelectrolyte solution-Chitlac (lactose-modified chitosan) and was used to coating methacrylic thermosets (Travan et al, 2011). This study was aimed at evaluating the in vitro biological response of human gingival fibroblasts (HGFs)/Streptococcus mitis co-colture to this nanocomposite system. HGFs were obtained from fragments of healthy marginal gingival tissue, co-cultured with the clinical strain of S. mitis and treated for 24 -48 h with thermosets (uncoated or coated with Chitlac or Chitlac n-Ag). Cytotoxicity was evaluated by LDH assay; cell morphology and adhesion were verified by means of SEM and optical microscopy; cell migration was studied by a modified Boyden chamber and finally IL-6 and PGE_2 secretion were detected by ELISA assays. In vitro results showed that in our co-culture model, which mimics the microenvironment of the oral cavity, the nanocomposite material does not exert cytotoxic effect towards HGFs that are able to adhere and migrate. The secretion of IL-6 is significant, but PGE_2 production is minimal suggesting that IL-6 production is not related to an inflammatory response. Basing on its good biocompatibility we suggest this new tool useful for the realization of dental devices.

References

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Key words
BisGMA/TEGDMA, co-culture, saliva, silver coated thermosets, cytotoxicity.