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Effects of methacrilyc thermosets coated with Silver-polysaccharide nanocomposite on HGFs adhesion in a S. mitis co-culture system

Silvia Sancilio [1] - Marialucia Gallorini [1] - Monica Rapino [2] - Valentina Di Valerio [3] - Eleonora Marsich [4] - Mara Di Giulio [1] - Amelia Cataldi [1] - Viviana Di Giacomo [1]

[1] "G. d'Annunzio" University of Chieti-Pescara, Department of Pharmacy, Chieti, Italia - [2] "G. d'Annunzio" University of Chieti-Pescara, Genetic Molecular Institute of CNR, Unit of Chieti, Chieti, Italia - [3] "G. d'Annunzio" University of Chieti-Pescara, Department of Medicine and Ageing Sciences, Chieti, Italia – [4] University of Trieste, Department of Medicine, Surgery and Health Sciences, Trieste, Italia

Silver based medical products have been proven to be effective in retarding and preventing bacterial growth, being silver reported to control infections since ancient times (1). In the field of dentistry, the use of silver ions/nanoparticles has been explored to counteract bacteria in resins and implants, as silver can destroy bacterial cell walls by reacting with the thiol groups (–SH) of proteins exposed to the extracellular portion of the bacterial membrane. Conversely, eukaryotic cells lack these exterior binding sites, so nanoparticles are supposed to interact with them only upon metal internalization (2). To reduce both bacterial adhesion to dental devices and cytotoxicity against eukaryotic cells, we coated BisGMA/TEGDMA methacrylic thermosets with a new material, Chitlac-nAg, formed by stabilized silver nanoparticles with a polyelectrolyte solution containing Chitlac. Here we analyzed the proliferative and adhesive ability of human gingival fibroblasts (HGFs) on BisGMA/TEGDMA thermosets uncoated and coated with AgNPs in a co-culture model system with Streptococcus mitis. After 48 h, HGFs well adhered onto both surfaces, while S. mitis cytotoxic response was higher in the presence of AgNPs coated thermosets. After 24 h thermosets coated with Chitlac as well as those coated with Chitlac-nAg exerted a minimal cytotoxic effect on HGFs, while after 48 h LDH release rised up to 20%. Moreover, the presence of S. mitis reduced this release mainly when HGFs adhered to Chitlac-nAg coated thermosets. The reduced secretion of collagen type I was significant in the presence of both surfaces even more when saliva is added. Integrin β1 localized closely to cell membranes onto Chitlac-nAg thermosets and PKC α translocated into nuclei. These data confirm that Chitlac-nAg thermosets have a promising utilization in the field of restorative dentistry exerting their antimicrobial activity due to AgNPs without cytotoxicity for eukaryotic cells.

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References

[1] Panacek et al. (2006) Silver colloid nanoparticles: synthesis, characterization, and their antibacterial activity. J Phys Chem B,110:16248–53.

[2] Travan et al. (2011) Silver-polysaccharide nanocomposite antimicrobial coatings for methacrylic thermosets. Acta Biomater,7:337-346;doi: 10.1016/j.actbio.2010.07.024.

Keywords

Human gingival fibroblasts; co-culture; Chitlac-nAg.