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Toxicity evaluation of some dental materials: Three-dimensional confocal laser scanning microscopy. Time-lapse imaging of cell behavior

Nina Attik
University of Lyon, France

Abstract

The purpose of this study was to investigate the in vitro biocompatibility of two dental composites used for direct restoration (namely A and B), using innovative 3-dimensional Confocal Laser Scanning Microscopy (CLSM). Time-lapse imaging was performed on cultured human gingival fibroblast cells after staining using Live/Dead®. Image series were obtained with a FV10i confocal biological inverted system (Olympus, France). Image analysis showed a higher mortality rate in the presence of composite A than composite B. The viability rate decreased in a time-dependent manner during the 5 hours of exposure. Morphological alterations were associated with toxic effects; cells were enlarged and more rounded in the presence of composite A as shown by F-actin and cell nuclei staining. Composite B was significantly better tolerated than composite A at all investigated end-points and all time- points. Our findings highlighted the use of the CLSM time-lapse imaging as a sensitive method to distinguish the biocompatibility behavior of two composites based on similar methacrylate monomers. The CLSM method is recently used to evaluate the biocompatibility of a chitosan coating implant (dental implantology), a PLGA scaffold (periodontal ligament regeneration and some crosslinked hydrogels of hyaluronic acid (gingiva reparation). Promising results have been recently obtained. This confirms the need to choose adequate investigation methods when biocompatibility of dental materials is assessed. In conclusion, when deciding which cytotoxicity assay to adopt for a particular study it is important to understand the benefits of each assay. Results underline that CLSM imaging could be used for various biomaterials biocompatibility evaluation.

Biography

Nina Attik has completed her PhD (European PhD) with high honors from Nancy University and postdoctoral studies from Paris University School of Medicine. Winner of the Support Program for the Creation of Innovative Companies in the Mediterranean (PACEIM: 2011). She has published more than 9 papers in reputed journals and has participated as speaker in different conferences and meetings (national and international). She had also conduct many research projects and manages many laboratory budgets.