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Cytotoxicity evaluation of a hydroxyapatite-reinforced polymeric resin using human peripheral blood mononuclear cells

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The use of hydroxyapatite-reinforced composite materials in the medical field has considerably increased in recent years because of the high biocompatibility and bioactive properties of this material, especially when it is used in bone replacement applications. It is imperative that new materials are thoroughly analyzed to ensure bio-functionality. This study describes the response of human peripheral blood mononuclear cells (PBMCs), separated from leukocyte packages obtained from healthy donors, in contact with a 90-10 weight % composite manufactured from an isophthalic polyester resin and reinforced with HAp and calcium triphosphate particles. The viability of PBMCs in the presence of this novel composite was evaluated every 24 hours for 5 days using commercial luminescent cell viability assay (Premix WST-1 Cell Proliferation Assay), positive and negative controls were used. PBMCs are part of the immune system and are usually stimulated by antigens and mitogens. Although the viability assessment demonstrated that HAp-reinforced resin does not have a cytotoxic effect on the PBMCs, the high cell proliferation values obtained via ELISA could be due to a mitogenic or antigenic effect of the composite. Because of the elevated cell proliferation, it was needed to confirm that the material was not acting as a mitogen. To do this, yellow tetrazolium MTT (3-(4, 5-dimethylthiazolyl-2)-2, 5-diphenyltetrazolium bromide) assay with the cell line 231 (breast cancer cells) was performed. The viability of this 231 cell line was not affected by the presence of the composite. Based on the results, a pro-inflammatory mediator production assessment should be performed.

Biography

Nayeli Camacho completed her PhD from the University of Texas at El Paso in the USA and Post-doctoral studies from the National Polytechnic Institute, Engineering Department, Mexico City, Mexico. She is a CONACYT Research Fellow working at the Center for Engineering and Industrial Development which is part of a system of research centers managed by the National Council of Science and Technology, CONACYT.

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