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Biological properties of a new Si-Ca-P porous scaffold for tissue engineering

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In the last few decades, life expectancy of the population has increased as a consequence of health improvements, increasing the incidence of bone problems, like fractures, osteoporosis and bone metastasis. Traditionally, these bone lesions are treated by reconstructive surgery, using autologous, allogeneic or xenogeneic implants, having the problems of lack of donated organs and tissues as well as the immune rejection. For this reason, the emergence of tissue engineering was necessary. This science studies how to achieve the regeneration of diseased tissues using scaffolds with appropriate physical and biological properties. Silicon (Si) is a trace element that enhances bone formation and maturation in the body. Therefore, in this work, an 85 wt% C2S-15 wt% TCP porous scaffold has been studied for future medical uses. The porous scaffolds were produced by the polymer replication method using polyurethane sponges with open cells as a template. They were impregnated with appropriate ceramic slurry and sintered. After obtaining the porous scaffold, ions release was performed to know their behavior in DMEM, cytotoxicity and metabolic activity assays were carried out to know their biocompatibility with adult human Mesenchymal Stem Cells (ahMSC) and, finally, FESEM images were obtained to observe the morphology of the ahMSC over the surface of the material. The exchange of ions between the media and the material was good and the rest of experiments showed a low cytotoxicity and a good metabolic activity of the ahMSC, as well as a good morphology of the cells over the surface of the material at different times. We can conclude that these scaffolds could be a good option for future uses in regenerative medicine, although more *in vitro* and *in vivo* experiments will be necessary to complete this study.

Biography

Patricia Ros-Tárraga completed her Graduation at Universidad Miguel Hernández of Elche (UMH). Currently, she is pursuing her Pre-doctoral studies at Universidad Católica San Antonio de Murcia (UCAM), and working in the design and development of new bioactive materials and their use in the field of Bone Tissue Regeneration. She studies the physical properties of Si-Ca-P-based scaffolds and their effect on the adult human Mesenchymal Stem Cells (ahMSC) behavior.

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