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5th World Congress on
Materials Science & Engineering
June 13-15, 2016 Alicante, Spain

Influence of ionic dissolution of Si-Ca-P biphasic ceramics on multipotent stem cells proliferation and *in vitro* mineralization

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Silicon (Si) is a trace element that enhances bone formation and maturation in the body; thus apatite ceramics containing Si are expected to increase the speed of bony regeneration. The mesenchymal stem cells from human bone marrow (ahMSCs) are a great promise for cell-based therapies by their ability to differentiate into osteoblast in certain microenvironments. For this purpose we have developed three biomaterials EC1 31% TCP-69%C_2S, EC2 59.5% TCP-40.5% C_2S, EC3 83% TCP-17% C_2S. The presence of bone-like apatite layer on the material surface after soaking in SBF was demonstrated by X-ray diffraction scanning electron microscopy (XRD-SEM). The effect of ionic dissolution from the three materials, on *ah*MSCs proliferation was investigated (SEM and MTT proliferation assay) and *in vitro* mineralization (Alizarin Red staining) at week 1, 2, 3, 4 in DMEM and osteogenic medium (OM). When biomaterials are placed in culture medium release ions at different concentrations and an apatitic layer forms on their surfaces. *ah*MSCs are therefore able to adhere, but only EC2 strongly increments *ah*MSC proliferation. At 28 days EC1 and EC2 plus OM, significantly enhanced the formation of mineralized nodules, based on Alizarin Red hystochemical staining; giving EC2 the best result. We conclude that all the materials are non-toxics, as the cells adhere and proliferate on their surface, although on EC2 material proliferation rate is higher (SEM images and MTT quantification). The association of EC2 with OM stimulates cells better than the other combinations.

Biography

Patricia Ros is a Biotechnology graduated at Universidad Miguel Hernández of Elche (UMH). Actually, he is a pre-doctoral student at Universidad Católica San Antonio de Murcia (UCAM), and he is working in the design and development of new bioactive materials and their use in the field of bone tissue regeneration. He is studying the physical characterization of Si-Ca-P-based scaffolds and their effect on the adult human Mesenchymal Stem Cells (ahMSC) behavior.

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