

BIOMATERIALS

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Nurse's A-phase material enhance adhesion, growth and differentiation of human bone marrow-derived stromal mesenchymal stem cells

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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. The purpose of this study was to evaluate the effect of a well-characterized Nurse's A-phase (7CaO·P2O5·2SiO2) ceramic compared to a control (tissue culture polystyrene-TCPS) on osteogenic differentiation of *ahMSCs in vitro*. Alizarin Red-S (AR-s) staining, alkaline phosphatase (ALP) activity, and collagen I (COLI) were evaluated. Also, field emission scanning electron microscopy (FESEM) images were acquired in order to visualize the morphology of the cells. The entire surface was colonized after 28 days of culture in growth medium (GM). Osteoblastic differentiation markers were significantly enhanced in cells growing on Nurse's A phase ceramic and cultured with osteogenic medium (OM), and cells acquired polygonal shape typical from osteoblasts, probably due to the role of silica to stimulate the differentiation of *ahMSCs*. Moreover, calcium nodules were formed under the influence of ceramic material. Therefore, it is predicted that Nurse's A-phase ceramic would present high biocompatibility and good osteoconductivity, being a good candidate to be used as a biomaterial for bone tissue engineering.

Biography

Rubén Rabadán Ros is a Biologist at the University of Murcia (UMU). He completed his MSc degree in Molecular Biology and Biotechnology from the same University. Currently, he is a PhD student in Biomedical Sciences at Universidad Católica San Antonio, Murcia (UCAM), developing scaffolds based on the C2S-TCP phase diagram and their *in vitro* and *in vivo* study.

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