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Effect of a new biomaterials in the system tricalcium phosphate – dicalcium silicate on osteogenic markers expression in human mesenquimal stem cells

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To take advantage of the beneficial effect of Si, novel materials with compositions derived from the Dicalcium Silicate-Tricalcium phosphate (C_2S-TCP) phase diagram were developed (EC1 31 wt%TCP-69 wt%C_2S; EC2 59.5 wt%TCP-40.5 wt%C_2S; EC3 83 wt% TCP-17 wt% C_2S). Phase composition effect on their ability to support adult human mesenchymal stem cells (*ah*MSCs) growth and osteogenic differentiation induction in presence of DMEM or an osteogenic medium (OM) was therefore investigated. The ahMSCs were examined at 1, 2, 3, 4 weeks in culture, for the osteoblast phenotypic markers alkaline phosphatase (ALP), osteocalcin (OCN), osteopontin (OPN) and cell surface marker CD105. At week 2, the population of ALP + cells was similar for all samples. At week 4, the proportion of cells ALP + increased significantly in EC2 samples. At week 1, *ah*MSCs expressed the CD105 marker in all samples, but in OM CD105 expression decrease significantly for EC1 and EC2 samples. Treatment with OM increased the gene expression of the bone extracellular matrix proteins OPN and OCN as determined by RT-PCR analysis. Addition of OM changed significantly the results: best result for ALP was obtained at 28 days for EC2 biomaterial; best OCN, OPN and RUNX2 expression was obtained at 21 days for EC2 material; best CD105 surface expression decrease on 21 days in OM for all samples. This results overlap because the gene expression have to increase before protein production, and confirms our hypothesis as we don't expected to see changes before week 3, and we hypothesize that OM effect summarizes to the biomaterial differentiation induction potential.

Biography

Rubén Rabadán Ros is a biologist by the University of Murcia (UMU) and has a MSc degree in Molecular Biology and Biotechnology by the same university. Currently, he is a PhD student in Biomedical Sciences at Saint Anthony Catholic University of Murcia (UCAM), developing scaffolds based on the C_2S-TCP phase diagram and their *in vitro* and *in vivo* study.

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