Early assessment of silk fibroin mesh/adult human mesenchymal stem cells (*ah*MSCs) association for stem-cell-based tissue engineering

Ros Tarraga P[1], Aznar-Cervantes S[2], Rabadan-Ros R[1], Acosta Martinez J[1], Abel Lozano-Perez A[2], Cenis J L[2] and Meseguer-Olmo L[1,3]

[1]*UCAM-Universidad Católica San Antonio, Spain*

[2]*Unidad de Biotecnologia-IMIDA, Spain*

[3]*V. Arrixaca University Hospital, Spain*

Abstract

Biomaterials are used in tissue engineering with the aim to repair tissues and organs. Since stem cells can be readily isolated, expanded and transplanted, their application in cell-based therapies is a major focus of research. We test the behaviour of *ah*MSCs on silk fibroin based biomaterial in order to use it for tissue repair. Silk fibroin mesh was obtained by electrospinning of fibroin obtained from cocoons of silkworms. *ah*MSCs were obtained by aspiration of ileac crest from healthy volunteer and isolated by gradient ficoll (SEPAX™) and cultivated in α-MEM supplemented with FCS and penicillin G /streptomycin sulphate (100 U ml^{-1} and 100 μg ml^{-1}). 1.0 x 10^5 *ah*MSCs were seeded onto the material in 24-well plates and analyzed at 72 h and 1, 2, 3, and 4 weeks. The growth rate, morphology, adherence was analized at different times using ImageJ ™ software, PhCM and SEM. At 72h, the *ah*MSCs cultured had a flattened polygonal appearance with spread cytoplasmatic extensions. Later, at 1 week, the adhesion was enhanced by means of multiple philopodia. Abundant extracellular matrix was observed occupying intercellular gaps. At 3-4 weeks, the cells became confluent forming an homogeneous monolayer almost coating the whole of the mesh. The cells showed a strong adhesion to the microfiber and proliferated in a short period of time (1 week). At the confluence, collagen-like lattices occupied the intercellular gaps. No cytotoxicity phenomena was detected. So, we can suggest that the material is a suitable substrate for *ah*MSCs growth and stem cell-based tissue engineering.

Biography

Ros Tárraga P 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.

lmeseguer.doc@gmail.com