

5th World Congress on **Biotechnology**

June 25-27, 2014 Valencia Conference Centre, Valencia, Spain

Designing a scaffold for tissue engineering applications by using biopolymers and nanoparticles

Cristian A Acevedo, Juan C Forero, Miguel A Fuentes and Elizabeth Y Sánchez
Universidad Técnica Federico Santa María, Chile

Scaffolds based on crosslinked sponges of biopolymers are extensively used for tissue engineering. Biopolymeric scaffolds have been used to regenerate skin, bones and other tissues. Furthermore, modifications of biopolymers with nanoparticles improve physical properties of the scaffolds allowing good development of cells. In this work it was developed scaffolds based on gelatin and chitosan (biopolymers) by using the freeze-drying process. Sponges obtained were covalent cross-linked and characterized with a differential scanning calorimeter (DSC). Optimal processing conditions (freeze temperature and crosslinking degree) were obtained by means of an experimental design approach. The scaffold was improved by addition of nanoparticles. We used hydroxyapatite nanoparticles blended with the biopolymers. The effect of nanoparticles in the polymeric matrix was studied with scanning electron microscopy (SEM). Images obtained by SEM indicated that pore morphology of polymeric scaffold is strongly affected by nanoparticles inclusion. Fibroblasts were used to investigate the interactions between cells and scaffolds. Results indicated that the behavior of cells seeded on scaffolds is strongly dependent of the microstructure. A specific combination of gelatin and chitosan was selected to obtain adequate structural properties, and the addition of nanoparticles allowed improve the scaffold. The scaffold formulation with optimal microstructure properties was validated cultivating fibroblasts. High cell viability was observed. The scaffolds allow that cells seeded on them grow adequately. Moreover, migration of the cells was observed. As conclusion, the behavior of cells seeded on the scaffold is satisfactory for tissue engineering applications.

Biography

Cristian A Acevedo is Associate Researcher of Biotechnology Center at the Federico Santa María University (Chile). He has extensive experience in the design of biomaterials and human cell immobilization to be used in medical applications. He has been involved in grants funded by Fondecyt (Chilean government). He has published more than 25 papers in ISI journals and has been serving as international reviewer in prestigious journals.

cristian.acevedo@usm.cl