A. Berna et al., J Tissue Sci Eng 2012, 3:3
http://dx.doi.org/10.4172/2157-7552.S1.007

OMICS Group Conferences
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International Conference on
Tissue Science & Engineering

October 1-3, 2012 DoubleTree by Hilton Chicago-North Shore, USA

A new natural biodegradable polymer scaffold architecture for tissue engineering

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Pore architecture parameters in three dimensional scaffolds play an important role in tissue engineering. Also, the design of scaffolds with gradient pore structures (variable pore size and porosity distribution) has attracted recent interest in order to mimic native tissues with gradients across a spatial volume. The increase of specific surface area may have added advantages with regard to cell viability.

The aims of this study were to produce scaffolds that display a gradient in porosity and a new well interconnected porous structure, where microstructures (termed as microscaffolds) can be generated inside the pores of the scaffold by using a modified solvent casting and particulate leaching method.

Solid, hollow and stuffed microspheres were used as a porogenic material to produce a template by a sintherization process. Different natural biodegradable polymer solutions (chitosan, agarose and gelatine) were casted over different templates. Then, the samples were placed in an oven to remove the solvent by evaporation and finally the template was eliminated with the proper solvent. The scaffolds were characterized by standard SEM and porosity. SEM micrographs show microscaffolds inside some of the pores of the polymer scaffold which have an open and well interconnected pore structure. Also, a gradient of porosity towards the central region of the chitosan scaffolds was observed.

A new scaffold structure which consists of microscaffolds inside some of the pores of the scaffolds can be produce by using stuffed microspheres, which in turn are stuffed with other microspheres, as porogenic material. Also, a new gradient chitosan structure was developed.

Biography

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