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Central nervous system trauma and neurodegenerative diseases involve massive neuronal and glial cell death and loss of the three-dimensional spatial organization and connectivity of the neuronal networks. In this work we employ a biostable model system to study differentiation and viability of neural precursors in 3D scaffolds.

Polymer scaffolds with interconnected porous with 90 microns of pore size were produced varying the hydrophobic-hydrophilic monomeric units ratio along the polymer chain. The materials studied, biocompatible and biostable, were polymer or copolymer networks based on the hydrophobic homopolymer poly(ethyl acrylate), PEA, and its copolymers with hydroxyethyl acrylate, p(EA-co-HEA) and methacrylic acid, p(EA-co-MAAc). In these biomaterials, the survival of differentiated functional neurons derived from cultured subventricular zone (SVZ) postnatal neural stem cells was investigated.

The tissues obtained from the SVZ of postnatal rats were plated in DMEM/F12 basal medium, with EGF and FGF as single suspensions. The formed spheres (neurospheres) were then collected and dissociated mechanically, the new microspheres formed were dissociated again and the process was repeated two times. After dissociation at the third passage, cells were seeded onto the different biomaterials with a differentiation medium of neurospheres.

The neuronal cells were identified by immunocytochemical labeling for the neuronal marker TUJ1, and for the glial marker GFAP. The results with DAPI showed that in all the materials, but mainly in p(EA-co-MAAc) scaffolds, cells survived inside the pores of the biomaterial. These are promising results that prove that these constructs have great potential in neuronal tissue engineering.

(P 49) Biological Evaluation of Macroporous Scaffolds with Different Surface Energies for Regeneration of the Central Nervous System

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