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O.S.E.7.

MORPHOLOGY OF NANOFIBROUS MATERIALS IN MEDICINAL APPLICATIONS

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Medicinal applications such as cell therapy, wound dressings, skin regeneration or corneal transplants require special demands on the structure of used materials. Beside the biocompatibility, permeability and mechanical properties, the morphology is the most important attribute of the constructs. Specific surface area, volume and size of the pores have considerable effect on the cell adhesion, growth and proliferation. In case of the incorporated pharmaceutically active substances their release is also influenced by the internal structure of nanofibers.

Various polymeric nanofibers have been prepared by needle-less electrospinning as porous synthetic nonwovens. Scanning electron microscopy was used to observe the samples, to evaluate the fiber diameters and to reveal eventual arthefacts in the nanofibrous structure. BET nitrogen adsorption/desorption measurements were employed to measure the specific surface areas. Mercury porosimetry was used to determine total porosities and to compare pore size distributions of the prepared samples. Experiments based on the soaking of nanofibers into the non-solving liquid were used to measure total porosities. Various techniques brought valuable results; however, each method has some disadvantages and limitations. According to the found results, morphological characterization of nanofibrous materials requires a complex approach and evaluation of the results of various methods.

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O.S.E.8.

OSTEOGENIC POTENTIAL OF FRESHLY ISOLATED CELLS OF ADIPOSE-DERIVED MESENCHYMAL FRACTION APPLIED WITH NANOPARTICLES

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The aim of this study was to investigate the osteogenic potential of freshly isolated adipose tissue-derived mesenchymal stromal/stem cells (ASCs) in bone regeneration of rabbit calvaria defects. ASCs were applied together with calcium phosphate-poly-DL-lactide-co-glycolide (CP-PLGA) nanoparticles that are mixed in an appropriately prepared blood clot (BC). Parallelly were analysed defects filled with fragmented adipose tissue (FAT) instead of ASCs, with CP-PLGA in BC, and only with nanoparticles. Bone density in defects was measured after I, III and VI weeks, and histological examination was done after IV and VIII weeks after filling defects. Approach to assisted osteoregeneration which is based on the use of fresh non-induced ASCs has proven to be promising due to the favorable effect on bone regeneration and simplicity of their application.