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Poster title

Selected biodegradable and nonbiodegradable materials – their impact on cells growth and proliferation.

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The natural tissue scaffold– Extracellular Matrix (ECM) - is composed of an organic (protein, polysaccharide) and inorganic (i.e. hydroxy-apatite) components that when combined with the cells forms a tissue. A scaffold is an integral part of every tissue that besides providing the environment for cells to grow and exist, it also improves tissue's mechanical properties. It provides elasticity, flexibility and durability for the tissue. Tissue engineering approaches utilize artificial materials (biomaterials) as a substitute of natural ECM. The process of producing tissue scaffolds obtained from biodegradable polymers has become a very intensively researched area for the past several years. Most of the current work focuses on the design and preparation of scaffolds with use of various production technologies and different natural materials like chitosan, collagen, elastine and different synthetic ones, like polymer polycaprolactone (PCL), poly(lactic acid) (PLA), poly(ethylene oxide) (PEO). The objective of this study was to check the impact of the biomaterials on various cell types, and compare their growth pattern. Biodegradable PCL, and five of its hybrids: PCL+SHAP (SHAP, synthetic hydroxyapatite), PCL+NHAP (NHAP, natural hydroxyapatite), PCL+PLGA (PLGA , poly(lactide-co-glycolide), PCL+$CaCO_3$ as well as one non degradable biomaterial: polyacrylonitryl (PAN), were tested. For the experiments four different cell types were used: human dermal skin fibroblasts, B16F10 (mouse melanoma cells), HSkMEC (Human Skin Microvascular Endothelial Cells) and HEPC-CB1 (Human Endothelial Progenitor Cells – Cord Blood 1). Impacts of the biomaterials on cells were assessed: 1) by measuring cytotoxic effect of the biomaterials liquid extracts and 2) by direct contact test. The ability of cells to attach to the biomaterials was tested as well as cells' potential to growth and proliferate on the surface of the biomaterials. None of the tested biomaterials was cytotoxic towards the tested cells, making them a potential valuable raw ingredient for 3D scaffold development that would find its applications in tissue engineering. The differences in efficiency of cells attachment and proliferation between tested biomaterials and cells lines were observed. In addition, a stimulating effect of the biomaterials on cells growth was also detected.