Jana Havlikova, J Cell Sci Ther 2011, 2:4
doi: http://dx.doi.org/10.4172/2157-7013.S1.15

OMICS Group Conferences
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International Conference & Exhibition on
Cell Science & Stem Cell Research

29 Nov - 1 Dec 2011 Philadelphia Airport Marriott, USA

The influence of micropores and nanostructure of modified poly(ethylene terephthalate) scaffolds on proliferation and viability of vascular cells

Jana Havlikova[1], Karel Turek[2] and Lucie Bacakova[1]

[1]Centre for Cardiovascular Research, Institute of Physiology, Academy of Sciences of the Czech Republic, Czech Republic
[2]Nuclear Physics Institute, Academy of Sciences of the Czech Republic, Czech Republic

The commonly used prosthesis materials, such as poly(ethylene terephthalate) (PET) known also as Dacron, have been extensively used in large and middle-sized artery reconstruction. However, application of these frequently used materials is limited in small-caliber grafts. Blood vessel grafts with an internal diameter smaller than 6 mm are prone to fail mainly due to their thrombogenicity and poor haemodynamics. One of the possible solutions of these problems may be reconstruction of the *tunica intima* and *media* on the synthetic grafts. For this purpose, special PET foils were prepared.

Twelve-μm thick foil was irradiated by krypton ions, ultraviolet light and etched by 1M sodium hydroxide to obtain pores of defined diameter (from 0,2 μm to 2 μm) and density ($4x10^6$ cm^{-2}). This study investigated the influence of pore size and topography of the PET surface on the growth and viability of vascular smooth muscle cells (VSMC) and endothelial cells. It was confirmed that surface micropores modulate the adhesion, proliferation and viability of vascular cells. It seems that endothelial cells prefer pores around 1 μm. VSMC were usually without preference of a specific pore size, only on scaffolds with 2 μm large pores, decreased proliferation and viability was observed. According to these results, PET foils with 1 μm large pores were chosen for further experiments, in which these porous PET membranes could serve as synthetic analogues of internal elastic lamina separating vascular smooth muscle cells and endothelial cells in a newly constructed bioartificial vascular wall.

Biography

Jana Havlikova has completed her MD studies at The Institute of Chemical Technology (ICT), Prague, Czech Republic in 2009. She is a second year PhD student in the Department of Growth and Differentiation of Cell Populations, Institute of Physiology, Academy of Sciences of the Czech Republic.