P155. Growth Of Valve Interstitial Cells On Aligned And Randomly Oriented Electrospun Nanofibres

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OBJECTIVES: Nanofibres mimic the architecture and function of the natural extracellular matrix, and thus they can be applied for tissue engineering. In this study, we evaluated adhesion and growth of pig valve interstitial cells (VIC) in primary cultures on aligned or randomly oriented nanofibres.

METHODS: Nanofibres (Elmarco, Czech Republic) were made of polyamide (PA), polylactide (PLA), polycaprolactone (PCL), chitosan, and gelatine. Cells were visualized with AlexaFluor 488 and propidium iodide, or Texas Red C2-maleimide and Hoechst 33342. Imunofluorescence staining of alpha-actin, vinculin and talin was also performed, and pictures were taken under a confocal microscope Leica SP2.

RESULTS: The initial adhesion of cells on all types of nanofibres was similar to that on control microscopic glass coverslips, except chitosan, where it was reduced. On aligned nanofibres, the VIC were elongated and grew in parallel with the fibres. On chitosan, however, the cells did not spread and formed clusters. On day 7, the highest cell population densities were found on randomly oriented PA and PCL, and the lowest values on both chitosan and gelatine samples. The alpha-actin cytoskeleton was well-developed in cells on gelatine, PLA, PA, PCL, and glass. The alpha-actin filaments were mostly aligned with the long axis of VIC. Cells on all samples formed focal adhesion plaques containing vinculin or talin, i.e., integrin-associated proteins.

CONCLUSIONS: Degradable PCL, PLA, and gelatine nanofibres seem to be most promising temporary carriers for VIC cells for the construction of bioartificial heart valves.

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