

P156. Bilayer Of Vascular Smooth Muscle Cells (smc) And Endothelial Cells (ec) On A Nanofibre Mesh In A Pulse Bioreactor

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OBJECTIVES: Co-cultivation of various cell types is an important approach in tissue engineering. The aim of our work was to create a bilayer of vascular SMC and EC on nanofibre fabrics under pulse flow bioreactor conditioning.

METHODS: An Aramid nanofibre mesh was autoclaved, fixed in plastic wells using Cell Crown inserts and seeded with rat aortic SMC (2x10⁵ cells/cm²). After 4 days in the static culture system, the SMC were seeded with bovine pulmonary artery EC (2x10⁵ cells/cm²) and cultured for additional 4 days. The sample was then placed into a perfusion chamber of a bioreactor (ProVitroGmbH, Germany) with a pulse flow of the culture medium (DMEM+20% of fetal bovine serum). A control sample was left in the static culture system. After 17 days, the cells were stained for their differentiation markers, i.e. α -actin for SMC and von Willebrand factor for EC.

RESULTS: In the pulse bioreactor, a well-formed confluent bilayer of SMC and EC was created. Both cell types were well-stained for their differentiation markers. However, in the static culture system, only small islets of both cell types were observed, and the staining intensity for both differentiation markers was much weaker.

CONCLUSIONS: In contrast to the conventional static cell culture system, the pulse flow bioreactor allowed formation of confluent bilayer of relatively mature SMC and EC on a nanofibre mesh. This suggests that the dynamic cell cultivation is a necessary approach in engineering the vascular wall and heart valves.

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