AB153. 184. Kidney tissue engineering: hybrid electrospun scaffolds incorporating decellularized renal extracellular matrix

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Background: Allogeneic grafts currently offer the most definitive management of end stage renal disease; however, as a limited resource with a considerable side effect profile, they leave much to be desired. Tissue engineering offers novel strategies to address these issues. Here we present a novel hybrid electrospun platform incorporating rat renal extracellular matrix (ECM) into a polycaprolactone (PCL) scaffold, to support the growth of human renal epithelial cells. The scaffold morphology mimics the endogenous ECM structure, builds on work previously performed within the research group, and offers a new approach to renal tissue engineering.

Methods: Kidneys were harvested from 8-week-old rats and perfused via an arterial cannula with 0.25% sodium dodecyl sulphate for 4 hours. The resulting ECM was milled, and added 0.75wt/v%, 0.25wt/v% or 0wt/v% to 7wt/v% PCL in hexafluoroisopropanol, before electrospinning into mats of small randomly arranged fibres. Scaffolds were imaged, seeded with RC124s, and analysed at 5- and 10-day timepoints for cell viability, morphology, DNA quantity, and gene expression.

Results: The scaffolds produced were confirmed to have minimal residual detergent and near identical morphologies. Cell numbers increased over time on all scaffolds but more so on hybrid platforms. PCR results also favoured hybrids platforms, on which cells displayed a less stressed genotype.

Conclusions: Electrospinning of a hybrid scaffold incorporating perfusion decellularized ECM was here shown to support human renal epithelial cells and influence their proliferation. These results demand further study on the biochemical enhancement of polymer scaffolds through addition of endogenous proteins as platforms for renal tissue engineering.

Keywords: Tissue engineering; kidney; electrospinning; scaffold

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