European Respiratory Society
Annual Congress 2012

Abstract Number: 6018
Publication Number: 1861

Abstract Group: 8.2. Transplantation
Keywords: no keyword selected

Title: LSC 2012 abstract – Lung tissue engineering: generation and characterization of decellularized lung scaffolds for stem cell differentiation

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Body: The interaction of stem cells with the surrounding matrix environment is crucial for cell fate. The development of biomatrices that recapitulate the in vivo environment is a key component to driving differentiation of pluripotent cells into lung endoderm precursors. We investigate whether decellularized lungs with intact matrix composition can promote the differentiation of embryonic stem cells (ESC) into distal lung epithelial cells. Rat cadaveric lungs were decellularized by sequential tracheal lavages and retrograde pulmonary arterial perfusion using a range of physical, chemical, and enzymatic treatments. Histological staining, immunofluorescence, electron microscopy, and tensile testing have confirmed decellularization and preservation of matrix proteins. Murine ESC (Foxa2/CD4; Bry/GFP cells) were seeded onto scaffolds following endoderm induction using activin, and analysed for lung lineage marker expression. Seeded ES cells maintained FoxA2 expression and adopted an epithelial-like tubular organization. This demonstrates the ability of acellular lung scaffolds to support the adherence, proliferation, and potential differentiation of murine embryonic stem cells. Current studies are analysing their potential as viable scaffolds for the unidirectional differentiation of human endoderm-induced ESC (Hes2 cell line) into distal lung epithelial cells.