Cím:	GENERATION OF VASCULARIZED IN VITRO LUNG CONSTRUCT – A NOVEL TH ENGINEERED TISSUE CONSTRUCTS
Szerzõ:	Rapp Judit
További szerzõk:	Veronika Csöngei, Tamás Kovács, Mónika Avdicevic, Edit Kiss, Krisztian Kvell, Judit. E.
Munkahely:	Department of Pharmaceutical Biotechnology, Medical School, University of Pécs, Hungary

Introduction

Most of our knowledge about cell-cell interactions, signalling pathways or molecular biology is based on experiments by using monolayer cell cultures or animal models. To understand the more complex human body or set up a realistic model for pharmaceutical testing; 3D tissue cultures represent a promising technology. Tissue engineering has been a quickly developing field of biotechnological research, but the efficient induction of capillary vessel network in *in vitro* created tissue types remained a mystery. Irrespectively of the tissue type, the efficient blood supply is an essential criterion for making viable tissues as nutrients; oxygen, etc. reach the tissue through the blood vessel system. Without sufficient capillary network the implantation and survival of an engineered tissue is limited.

Aims

Our primary aim was to set up complex human three dimensional lung tissues that following implantation into a host body would be quickly and sufficiently vascularized for increased viability.

Materials and methods

Three dimensional (3D) lung tissue model was set up using human non-cancerous small airway epithelial cells (SAEC) and normal lung fibroblasts (NHLF). To investigate the process of vascularization of the implanted engineered tissue, the aggregates were implanted subcutaneously into the back or into ears of immunodeficient mice. Vascularization was monitored using non-invasive SPECT/CT, histology using hematoxylin-eosin (HE) and immunofluorescent staining to differentiate mouse and human-derived tissues in the implants.

Results

Three dimensional lung tissues were created using SAEC and NHLF cells. The implantations were performed successfully and increased perfusion was observed at the implantation site. HE staining confirmed the presence of the implanted tissue in the ears of test animals. Immunohystochemistry using specific antibodies identified mouse derived endothelial tissues in the 3D human tissue complexes.

Conclusion

In the presented work three dimensional tissue complexes were set up from cell types which are representing the two major cell types of the lung. We theorized that the third and extremely important cell type the endothelial cells are not needed during in vitro tissue engineering, as endothelial cells would grow into the engineered tissue once implanted into

the host. Using mice as test animals, we succeeded showing that vascularization is possible in such circumstances. These findings suggest that the 3D complex can connect to the host vascular system after implantation. The successful vascularization leads us one step closer to creating an applicable tissue construct beyond a minimum size.