

DECELLULARIZED PORCINE LIVER: BIOMATERIAL WITH HIGH POTENTIAL FOR LIVER TISSUE ENGINEERING

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Introduction

Decellularized liver scaffold represents a highly promising biomaterial for liver tissue engineering as it maintains extracellular matrix structure providing natural microenvironment for cells during recellularization [1]. Scaffolds of porcine origin could help to solve the lack of human tissue due to close human-pig genetic relationship as well as clinically relevant size of the organ. We focus on optimizing protocols for high quality scaffold preparation [2], cell-scaffold interaction and bioreactor design for scaffold recellularization.

Material and Methods

A standard decellularization technique, the use of frozen tissue, was compared with a new technique when a fresh organ was processed immediately after explantation utilizing porcine model. Protein composition of different liver scaffold compartments was studied by separating the compartments by laser microdissection followed by proteomic analysis. Initial interaction of scaffolds with cells in vitro was tested under static conditions, protein colocalization was identified by immunofluorescence staining.

Results

Both decellularization methods produced scaffolds of high quality, nevertheless the method of fresh liver decellularization appeared to be more gentle in preservation detailed scaffold morphology. Both types of scaffolds supported cell adhesion. Comparing protein composition of interlobular and sinusoidal parts of pig liver scaffolds revealed differences particularly in levels of several collagen types as well as some proteins of focal adhesions. During cell-scaffold interactions we identified colocalizations of adhesion molecules such as integrins with their extracellular matrix targets.

Conclusion

Optimizing liver scaffold preparation in combination with building up the knowledge about scaffold protein composition and cell-scaffold interaction can help to elucidate natural liver cell microenvironment, and in a longer term it can contribute to successful liver tissue preparation in vitro.

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References

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