30515

THE USE OF DECELLULARIZATED EXTRACELLULAR MATRIX (ECM) AS A SCAFFOLD FOR THE ESTABLISHMENT OF A BIOARTIFICIAL LIVER: IN VITRO AND EX VIVO STUDY

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Introduction: An insufficient supply of organs suitable for transplantation has limited the ability to cure many cases of liver diseases. Bioartificial Organs (BAO) are not a permanent alternative to transplantation, but the emergence of decellularized matrices as scaffold for bioartificial organs opens a new perspective for the study and treatment of liver diseases. Aim: Study the feasibility of using recellularizated extracellular matrix as a framework for the liver transplant in a 3D in vitro and ex vivo study. Methods: C57Bl6 (GPF+/GFP-) mice weighting 20-25 grams were used. For decellularization we used the technique described by Shupe et al., with modifications. The right hepatic lobe was excised with the vena cava (VC) preserved. Firstly the lobe was perfused ex-vivo with 20 mL PBS (pH 7.4) to clear blood. The lobe was then perfused with biological detergents to solubilize cell membranes. Isotonic solutions (PBS) of 1, 2 and 3% (w/v) Triton X-100 (20 mL each) were perfused through the liver lobe by peristaltic pump at a flow rate of 10 mL/hour. This was immediately followed by perfusion with 20 mL of PBS containing 0.1% SDS (w/v). Detergent containing solutions were cleared from the liver lobe by perfusion with PBS overnight. Finally, 2mL fetal bovine serum was pumped into the organ. For administration of cells (Primary hepatocyte and non-parenchymal cells), 107 co-cultured with ECM for the in vitro study and 5x107 cells were delivered to the organ through the VC for ex vivo study. All perfusion solutions (including FBS) contained 1% antibiotic/mycotic. Results: Liver cells were seeded at the ECM scaffold. In vitro study shown the tracking of liver cells in the ECM. The repopulation with primary hepatocyte and non-parenchymal cells is in final standardization through a semi-closed circulation system. Conclusion: The decellularization and recellularization of the liver matrix allow the use of a bioartificial organ as a scaffold for liver transplantation and study of 3D liver cells culture.