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Recellularized Rat Liver Scaffold: an *in vitro* Model for Biosafety Assessments

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ABSTRACT

In the last few decades, fully decellularized animal organ scaffolds have become an actively developing line of research in fields of cell biology and TERM (tissue engineering and regenerative medicine). Such scaffolds serve as improved 3D models providing natural microenvironments for cell interactions.

Our study aims to reproducibly generate a 3D in vitro liver model for drug metabolism and toxicity testing based on decellularized rat liver scaffolds. The primary objective is to validate the model's suitability for toxicity assessments using rat/human liver cell cocultures. To fully restore liver-specific functions, various cell types will be employed, including rat and human hepatocytes, undifferentiated and differentiated mesenchymal stem cells (MSCs), and macrophages. Metabolic functionality of the model will be confirmed by assessing liver-specific markers. To date, we have achieved high reproducibility in the preparation of decellularized rat liver scaffolds. Moreover, we demonstrated low cytotoxicity of liver scaffold material on human cell lines (HepG2 and HEK-293). Assays confirming low immunogenicity through T-cell activation are ongoing. Development of such a model will enable efficient drug candidate assessment while reducing animal testing.

Keywords: recellularization, liver scaffold, coculture, hepatotoxicity

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