

Patient Specific Liver-On-A-Chip Model

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BACKGROUND

The liver serves a vital role in drug metabolism and detoxification and the investigation of liver-drug interactions is an essential component of any preclinical drug study. Conventional animal models are costly, often unreliable, and difficult to translate to human studies due to the species-specific variations in hepatocellular functions. Liver tissue engineering has made significant progress towards the creation of in vitro liver models for drug screening, as well as in vivo constructs for addressing the large clinical need for transplant sources. However, cell sourcing remains a significant challenge for both in vivo and in vitro liver models. Human induced pluripotent stem cells (iPSCs) are a promising technology in regenerative medicine as they can be autologously derived, maintain high proliferative capacity, and demonstrate enormous differentiation potential, while also mitigating the ethical concerns associated with the use of embryonic stem cells. However, the application of iPSCs towards functional in vitro tissue models is still largely under development, and tissue-engineered constructs for in vivo transplantation have yet to be fully realized.

TECHNOLOGY DESCRIPTION

University researchers have developed methods and articles of manufacture that pertain to a functional in vitro micro-liver model. In the invention, hepatic progenitor cells (HPCs) derived from human iPSCs are encapsulated using a novel 3D biofabrication technique based on dynamic optical projection stereo lithography. In an exemplary embodiment, this “liver-on-a chip” model comprises a co-culture of HPCs and supportive cells within a scaffold closely mimicking the hepatic micro-architecture. The model can be made patient-specific and used as a reliable and cost-efficient in vitro platform to facilitate drug metabolism studies, preclinical drug screening, and fundamental hepatology research.

INTELLECTUAL PROPERTY INFO

This invention has a patent pending and is available for research sponsorship and/or licensing.

PATENT STATUS

Country	Type	Number	Dated	Case
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OTHER INFORMATION

KEYWORDS

micro-liver, stem cells, tissue engineering, drug screening

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