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Transplantation of bioengineered functional liver surrogates

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The shortage of eligible liver donors results in deaths of patients waiting for liver transplantation. It is imperative to identify alternative treatments to bridge the gap. Decellularized liver scaffold based liver regeneration is a promising approach to develop functional liver surrogates. In the current study, decellularized rat liver scaffolds were recellularized with human liver carcinoma cells (HepG2) and re-endothelialized with rat sinusoidal endothelial cells. Decellularized liver scaffolds that were only recellularized with HepG2 were served as the control group. *In vitro*, the liver scaffolds, that were repopulated with both HepG2 and endothelial cells, were found to upregulate hepatic cell specific genes and perform superior hepatic functions when compared to the counterparts that were only repopulated with HepG2. Recellularized liver scaffolds were under perfusion culture for seven days and then transplanted to recipient rats heterotopically. The vasculatures of the bioengineered liver grafts remained patent for at least 14

days post-transplantation as demonstrated by the ultrasound imaging. Moreover, Doppler ultrasound observed blood flow patterns similar in characteristics of the arterial and venous flows, respectively, in the bioengineered liver grafts. Functionally, the hepatic P450 metabolic activities and the human albumin production were both detected in the bioengineered liver grafts 14 days post-transplantation. Our results strengthened the feasibility of engineering functional liver surrogates utilizing decellularized liver scaffolds.

Speaker Biography

Fanwei Meng has completed his PhD in 2012 from the Department of Biomedical Engineering at the University of Utah. He later on conducted his Post-doctoral trainings at the McGowan Institute of Regenerative Medicine, University of Pittsburgh Medical Center as well as the University of Texas Medical Center. His research focuses on cell-derived biomaterials as well as biologic scaffold based regenerative approach. He has published more than 10 papers in reputed journals. He is currently an Associate Scientist at the Organ Transplantation Center of the King Faisal Specialist Hospital and Research Center at Saudi Arabia.

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