Hepatocyte Differentiation of hESC Cultured Under Xeno-Free and Feeder-Free Conditions

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End stage liver diseases can only be cured by whole liver transplantation. Because of limited supply of donor livers the supply will never meet the demand. Stem cells have shown to provide an unlimited cell source for hepatocytes, and could provide an alternative to patients requiring a transplantation. Human embryonic stem cells (hESCs) are self-renewing, pluripotent cells which can differentiate into any cell type in the body. Most of the hESC lines have been generated under a wide variety of culture conditions that include either mouse (MEF) or human feeder cells . This raises the concern that somatic cells developed from these stem cells would carry the risk of pathogenic contamination acquired from the feeder layer. This concern is currently prohibiting the translation of this technology for use in human. Feeder free culture of hESCs requires an ECM and media combination that maintains the pluripotency. I used different extracellular matrices (ECM) including Cell Start, which is a xeno-free (animal product free) fully defined humanized ECM and human recombinant Vitronectin in its full length and truncated forms. TeSR-E8 media was used for culturing the hESCs which is based on the E8-formulation developed by the laboratory of Dr. James Thomson (University of Wisconsin-Madison). I pursued the establishment of a xeno-free culturing method of ES1-017 cell line, and tested its efficiency in becoming functional hepatocytes. This study provides an important advancement in the effort to help stem cell based therapies get into the clinic where they can start helping people with hepatic diseases.

Awards Won:
Fourth Award of $500