567e Long Term 3d Primary Hepatocyte Culture in Nano-Scaffold Hydrogel for Bioartificial Liver

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Extracorporeal bioartificial liver devices (BAL) have been in the development to help recovery from acute liver failure and provide a bridge to liver transplantation. One challenge of BAL is to maintain primary isolated hepatocytes healthy and fully functional. The most common culture method for hepatocytes is collagen double gel sandwich culture (it stabilizes many liver-specific functions). However, there is a limitation in scale up in this method because of the restriction of low surface cell density. Matrigel is another commonly used method, however, it is extracted from animals and hence may have issue of immune rejection. In this paper, we have investigated long term primary hepatocyte culture using a peptide based synthetic self-assembling nanostructure hydrogel. It has an average pore size of 50~200nm and promotes cell attachment. The enlarged cell growth area in 3D makes it possible to increase the cell density of hepatocytes in bioartificial liver thus increasing the hepatic function. Our experimental results show that hepatocytes attached to 3 dimensional nanofibers after seeding and migrated to form stable hepatocyte spheroids within 5 to 6 days. Albumin and urea functions of clustered hepatocytes were similar to the collagen sandwich configuration. Moreover, we observed an improved cytochrome P450 function of hepatocytes in this hydrogel as compared to collagen sandwich configuration. Furthermore, because of its bio-compatibility, and 3D culture conditions the peptide based scaffold culture method may be of immense use in the area of hepatocyte transplantation.