PEEK-WC-PU Membranes for Expansion of Rat Embryonic Liver Cells

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Biomaterials play an important role in directing tissue growth and may provide another tool to manipulate and control stem cell behaviour, having a significant impact on the fields of regenerative medicine and tissue engineering. Herein, we designed and developed new bioactive membranes to be used for the expansion of rat embryonic liver cells.

New modified polyetheretherketone PEEK-WC membranes were prepared in hollow fibre configurations, by phase inversion technique. Their surface was modified by means of different plasma processes, introducing amino group. The performance of the developed biomaterials was evaluated by analysis of the expression of the liver specific functions of cells cultured in the 6-well bioreactor. Liver progenitors on the membranes exhibited higher functional activities compared to those cultured on conventional plates as demonstrated by higher albumin and urea production. They showed gene expression of AFP and albumin in a time-dependent manner of the hepatic differentiation process. LDH assay revealed that a high number of viable liver stem cells attached to the membranes. Unexpectedly, liver progenitors cultured on membrane bioreactors had higher telomerase activity than ones in the plates. Further, FACS analyses showed that cells grown on membranes had longer G1 phase while S phase was shortened. Thus, membrane bioreactors are able to sustain the same *in vivo* liver functions *in vitro* and to allow the expansion of stem cells.