HUMAN HEPATOMA HUH7 CELLS CULTURED ON MULTIWALL NANOTUBE SHEETS AND YARNS: MODULATION OF CELL MORPHOLOGY AND FUNCTION

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Abstract

There is extensive research showing that the cellular behaviour is strongly affected by changing the surface properties such as rigidity, roughness and surface topography. Experiments on many cell types cultured on substrates with nano-patterned topography have demonstrated that the cells align and extend along the direction of nano-grooves. Here, we show that the morphology of the liver-derived human hepatoma (Huh7) cell line can be controlled by the nanoscale topography of the substrate. Nano-grooved substrates, multiwall nanotube (MWNT) sheets and MWNT yarns induced changes in Huh7 cell morphology. Here where cells grew to confluent with elongated and aligned morphology along the nano-grooves/ridges. In addition, cell clustering was reduced on the aligned sheet in contrast to the cells on the flat bare cover glass. We found that the metabolic functions, albumin synthesis and cytochrome P450 activity of cells were enhanced on the substrates compared to the flat surface of control substrates. To summarize, Huh7 cells show favourable adhesion and proliferation on our substrates with no significant difference in term of cell viability measured by XTT absorbance. The morphology of cells can be altered by altering the substrates and the changes in cell morphology are reflected in changes in cell function. So, controlling the substrates where cells allows some control of the cell function. Our substrates offer control over topography on both the micro and the nanoscale and hence, possibly can be applied in vitro culture systems of hepatocytes for both diagnostic and therapeutic applications.

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