A cost-effective microfluidic cell-on-chip platform for Hepg2 cell using porous polymer membranes

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Abstract

Microfluidic 3D cell culture platforms are essentially microfluidic channels that support three-dimensional cell growth. As opposed to the conventional cell cultures in Petri dishes, microfluidic cell cultures offer the advantage of reproducing a 3D in-vivo like microenvironment. These cell-on-chip devices are a step closer to developing more efficient organ-on-chip devices that have the promise to revamp the existing drug development pipeline by eliminating animal testing, accelerating the process, and prevent clinical trial volunteers from life-threatening side effects in case of drug failure. We have designed a simple microfluidic cell-on-chip device to culture liver hepatocellular carcinoma (HepG2) cells through a customized photolithography process. Polydimethylsiloxane (PDMS) has been used to fabricate this device. The device supports HepG2 cell viability as evident from the cell viability assay, MTT. To check the effect of the substrate on cell adhesion and growth, we cast the device on various polymer substrates like polystyrene, PDMS, polyvinylidene fluoride (PVDF), nitrocellulose, and glass. In addition to this, the cytotoxicity of nanosilver at varying concentrations was visualized using MTT assay and PI staining. One of the advantages of this cell-on-chip platform is that it can be easily multiplexed and adapted to culture other cell types by making minor changes in the design.

Bibliography:

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