

A Biomimetic Cell Culture Platform for Microfluidic Cell-based Assays

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Abstract

Biomimetics is actively applied in cell culture systems including a bioreactor for keeping full functionality of *in vivo* organs.¹⁾ Recently, several trials to mimic an *in vivo* environment are demonstrated by combination of microfluidics and 3-dimensional cultivation in polymer-synthesized scaffolds or natural hydrogels.²⁾ Although these schemes are highly advanced as a cell culture system, they are not suitable for various cell-based assays. In this paper, we first describe a microfluidic cell culture platform by use of peptide hydrogel to better imitate the *in vivo*. The microchannel is fabricated by poly(dimethylsiloxane) replica molding. Mixture of the peptide hydrogel and human hepatocellular carcinoma cell (HepG2) is hydraulically focused by both sides of de-ionized water and media flow. Since the peptide hydrogel contacting the media self-assembles into a 3-dimensional transparent hydrogel, the HepG2 cells are immobilized in stripe shaped 3-dimensional microenvironment at the center of the main channel in a microfluidic device. By use of this biomimetic culture platform, the microfluidic device could be useful for reliable cell-based assays including 3-dimensional co-culture, cytotoxicity test, continuous monitoring of cell viability, drug screening, and drug-drug interaction study.

References

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