

# Author's Accepted Manuscript

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PII: S0039-9140(18)30823-3  
DOI: <https://doi.org/10.1016/j.talanta.2018.08.016>  
Reference: TAL18937

To appear in: *Talanta*

Received date: 4 June 2018  
Revised date: 27 July 2018  
Accepted date: 3 August 2018

Cite this article as: Shiqi Wang, Sifeng Mao, Min Li, Hai-Fang Li and Jin-Ming Lin, Near-physiological microenvironment simulation on chip to evaluate drug resistance of different loci in tumour mass, *Talanta*, <https://doi.org/10.1016/j.talanta.2018.08.016>

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# Near-physiological microenvironment simulation on chip to evaluate drug resistance of different loci in tumour mass

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## ABSTRACT

Developing a bio-functional model *in vitro* to study cancer resistance, which is a big challenge for clinical cancer therapy, is of great interest. Such reliable model requires appropriate drug diffusion kinetics simulation and a microenvironment that allows cell-cell and cell-matrix interactions. In this work, a special hydrogel-based three-dimensional (3D) microfluidic chip was constructed to simulate tumour-vascular microenvironment. The self-healing hydrogel supports long-time cell survival and proliferation, effective cellular metabolism of cancer drugs and cell-cell interaction between different types of cells. In the effective near-physiological tumour-vascular microenvironment, the endothelial and fibroblast cells are spread on different sides of a porous membrane, while sensitive and resistant breast tumour cells are separately cultured in the dynamic hydrogel consisting of glycol chitosan and telechelic difunctional poly (ethylene glycol) in the upper chambers.

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