

Microfluidic Devices for Cellular Bioimprint

Volker Nock¹, Lynn Murray¹, Fahmi Samsuri¹, Maan M. Alkaiji¹, John J. Evans²

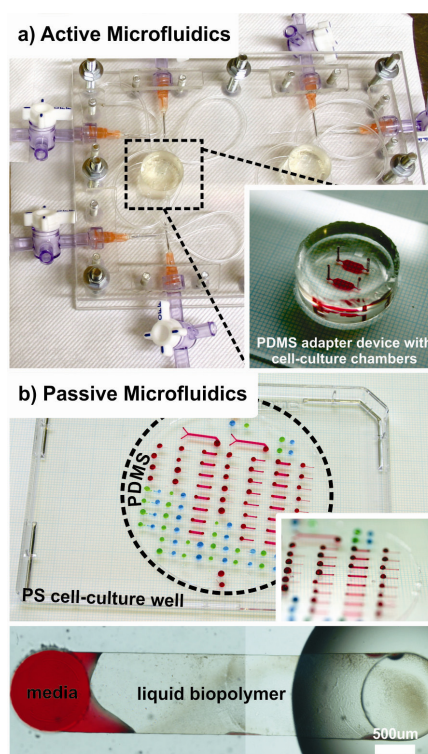
¹ The MacDiarmid Institute for Advanced Materials and Nanotechnology, University of Canterbury, Christchurch, New Zealand

² Christchurch School of Medicine and Health Sciences, University of Otago, New Zealand

Recent studies confirming the central role which the tissue microenvironment plays during tumor formation have lead to increasing interest in epigenetic contributions to cancer growth [1]. As these experiments have shown, normal tissues can be induced to become cancerous *in vivo* by altering the ECM structure. Furthermore, stroma from healthy adult animals can prevent neoplastic transformation and encourage normal growth of grafted epithelial cancer cells. In this context, a physical image of a certain cell phenotype captured into a biocompatible scaffold may impose cellular populations to display a similar phenotype.

Bioimprint is a process capable of permanently capturing a replica impression of cells for use in high-resolution imaging and analysis [2]. In a step towards scaffold formation, we have recently modified the original process by replacing the previously employed elastomers with a fast UV-curing, biocompatible, methacrylate copolymer to improve replication fidelity [3]. This material shows excellent feature replication; however, handling is less straightforward than for the previously used soft elastomers.

Thus, to enable the repeatable formation of biocompatible and potentially geometrically bioactive cell imprints, we have developed two microfluidic platforms based on active and passive pumping [4] for cell-culture and polymer delivery. In this paper, we introduce the Bioimprint process and the use of the two platforms for the culture and replication of Ishikawa endometrial cancer cells. The two different setups are shown in Fig.1. We will discuss the advantages of using microfluidics for Bioimprint in general and of the two different platforms in particular. Both platforms allow for controls and experimental cultures to be carried out simultaneously. Similarly, time lapse samples can be taken from the same array minimizing variables between cell culture sets and thus enabling cell developmental studies.



References

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