

## Flow characterization of a microfluidic device to selectively and reliably apply reagents to a cellular network

Michael F. Santillo, Imee G. Arcibal and Andrew G. Ewing\*

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### Electronic Supplementary Information

#### Device Fabrication

The fabrication details are illustrated Fig. S1. Masks were designed in Adobe Illustrator CS2 and printed onto transparency films by a laser photoplotter (The Photoplot Store, Colorado Springs, CO, USA). The pharmacological channel layer was made by depositing two 100  $\mu\text{m}$  thick layers of SU-8 50 photoresist (MicroChem Corp., Newton, MA, USA) onto a silicon wafer and exposing them sequentially with a mask aligner (Karl Suss MA6, Suss Microtec, Waterbury Center, VT, USA) according to the resist manufacturer protocol. The mold for the bulk channels was also photolithographically fabricated with a single 200  $\mu\text{m}$  layer of SU-8 100 resist. A 10 : 1 (base : curing agent) mixture of PDMS prepolymer (Sylgard 184, Dow Corning, Midland, MI, USA) was poured onto the master molds and cured in an oven at 70 °C for 2 h. For the pharmacological master, a weight was placed above the mold allowing the PDMS to form a thin, even layer with the posts so outlet holes would form.<sup>1</sup> The PDMS was peeled away from the master molds and 1.5 mm inlet holes removed with a leather punch. The pharmacological channel layer of PDMS was exposed to oxygen plasma and bonded to a glass slide, with the bulk channel layer subsequently bonded on top of the pharmacological channel layer. For the purposes of this study, only two bulk channels, arranged perpendicular to each other, were attached to the pharmacological layer for ease in flow characterization. The distance between the exits of these bulk channels and the pharmacological channel outlet holes was varied to investigate the effects of distance on flow exiting the pharmacological channels. NanoPorts™ (Upchurch Scientific, Oak Harbor, WA, USA) were assembled according to the manufacturer's instructions and attached to the pharmacological channel inlet holes.

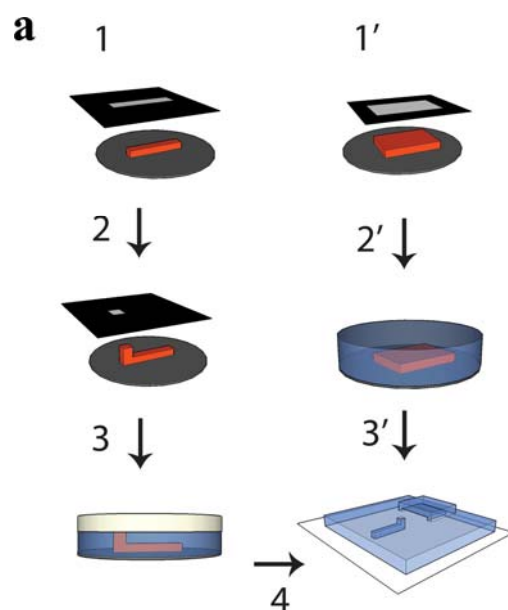


Fig. S1 Fabrication scheme for making the complete microfluidic device. The master for the lower pharmacological layer is produced from two layers of photoresist, which are exposed sequentially through masks (steps 1 and 2). PDMS and a weight are placed onto the master (step 3) and it is cured. The bulk channel layer involves a single photoresist layer and exposure (steps 1' and 2') to create the larger channel. Following PDMS curing on both masters, the polymer is removed and adhered to a glass slide by exposure to oxygen plasma (steps 3' and 4). Inlet holes and NanoPorts<sup>™</sup> are not shown and only one pharmacological channel is shown for sake of simplicity.

1. B. H. Jo, L. M. Van Lerberghe, K. M. Motsegood and D. J. Beebe, *J. Microelectromech. Syst.*, 2000, **9**, 76.