Fluidic Isolation within XonaChips®

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Abstract

Distinct axonal and somatodendritic microenvironments can be established within compartmentalized XonaChips® by fluidically isolating one compartment from the other. This TechNote details this procedure using the dye, Alexa Fluor 488 hydrazide.

Introduction

Xona's compartmentalized devices and chips provide the unique ability to create distinct fluidic microenvironments[1]. This TechNote details the procedure for establishing fluidic isolation between the main compartments of XonaChips®. For more information on cyclic olefin copolymer XonaChips® [2,3], see the Introducing XonaChips® technote.

Procedure

1. Prepare XonaChips® and culture neurons according to the appropriate protocol (refer to http://www.xonamicrofluidics.com/protocols/).
2. Remove 20 µL from the lower left well of the axonal compartment and place into the upper right well of the somatic compartment. Wait 2 min for flow within each channel to equilibrate.
3. Remove 50 µL of media from the axonal compartment. Add 0.3 µL of 1 mM Alexa Fluor 488 hydrazide to this media, mix via pipet and return back to the axonal compartment. The chip is ready for imaging.

NOTE: Other compounds of interest can be added. Adding a fluorescent dye with a similar molecular weight as the compound of interest is recommended in order to monitor fluidic isolation over time.

Example Result

To demonstrate fluidic isolation, neurons were first dissociated from E18 rat hippocampus and cultured within two compartment XonaChips® (XC450) as described in the XonaChip® protocol. Neurons were retrogradely labeled at 18 days *in-vitro*, by applying a G-deleted mCherry rabies virus[2-6] to the axonal compartment. At 3 days post-infection, a low molecular weight dye- Alexa Fluor 488 hydrazide (pseudocolored magenta) was applied to the axonal compartment. No trace of fluorescence was detected within somatic compartment observed by confocal microscopy (**Fig 1**). Montage images of somatic and axonal compartments were acquired within one hour after adding the dye by laser scanning confocal microscope using a 30×/1.05 N.A. silicone oil (ne = 1.406) objective lens.

Conclusion

In summary, both XonaChips® and Xona's silicone devices provide fluidic isolation of axonal compartment from somatodendritic compartment. These fluidically isolated Xona devices provide compartmentalized application of drugs presenting high reproducibility and reliability in drug

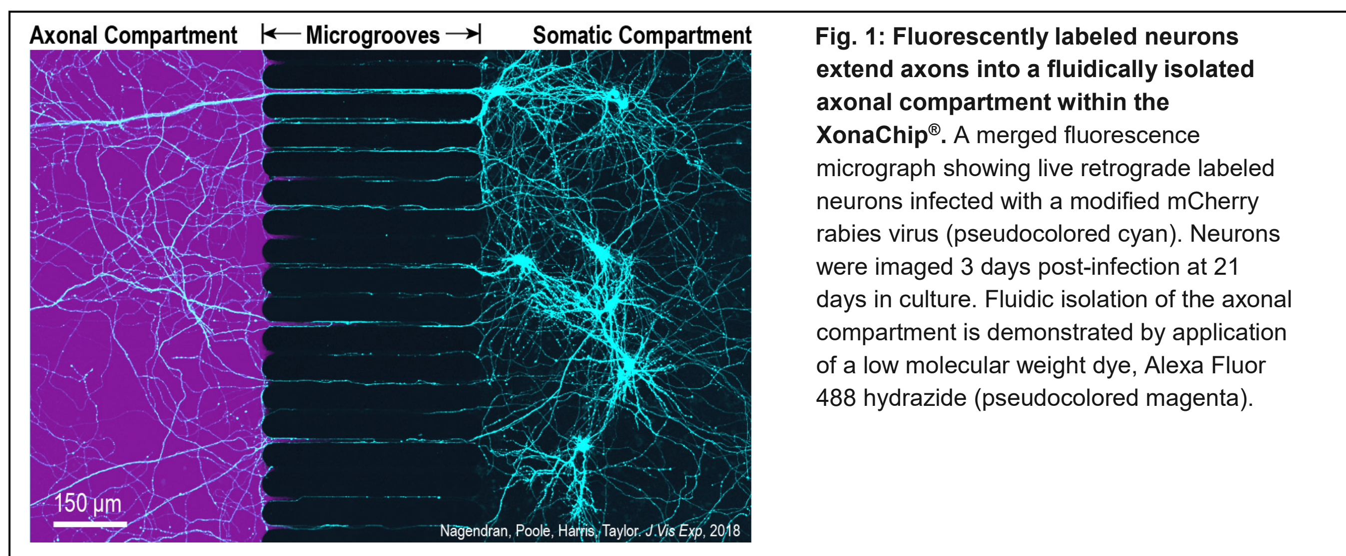

Fig. 1: Fluorescently labeled neurons extend axons into a fluidically isolated axonal compartment within the XonaChip®. A merged fluorescence micrograph showing live retrograde labeled neurons infected with a modified mCherry rabies virus (pseudocolored cyan). Neurons were imaged 3 days post-infection at 21 days in culture. Fluidic isolation of the axonal compartment is demonstrated by application of a low molecular weight dye, Alexa Fluor 488 hydrazide (pseudocolored magenta).

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screening studies.

About Xona Microfluidics, Inc

Xona Microfluidics, Inc is a life sciences company based in Research Triangle Park, North Carolina. More information can be found at xonamicrofluidics.com.

If you are interested in testing XonaChips® contact us at info@xona.us

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