Co-culturing neuronal and non-neuronal cells within Xona's Silicone Devices and XonaChips®

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Abstract

Xona's platform technology serves as an indispensable *in vitro* tool for co-culture studies. This TechNote highlights different examples of co-culturing neuronal and non-neuronal cells together within Xona's microfluidic devices and chips, including the culture of muscle cells, keratinocytes, and oligodendrocytes.

Xona Microfluidics' patented technology is widely used by neuroscience researchers for co-culture studies. Our compartmentalized devices and chips establish isolated microenvironments that enable culturing both neuronal and non-neuronal cells (**Table 1**). For example, co-culturing murine primary neurons or stem cell derived neurons in one compartment to innervate muscle cells in the adjoining compartment (**Fig. 1**) creates a functional *in-vitro* NMJ (neuromuscular junction)[1,2]. Publications also show co-culturing DRG neurons with either keratinocytes[3] or human mesenchymal stem cell differentiated osteoblasts[4] to investigate the effects of innervation of these target cells.

Xona's platform technology is also used to co-culture neurons and glia. For example, neurons were cultured with oligodendrocytes[5], microglia[6], astrocytes[7-9].

Together, the outcome of these co-culture studies provides insight into the molecular mechanisms involved in NMJ development, mechanosensation, myelination and bone innervation[1-9].

Table 1: Examples of different cell types co-cultured within Xona microfluidic devices.

Neuron cell type	Target Cell type	Reference
Mouse embryonic stem cell (mESC)-derived motor neurons	Mouse primary myoblast-derived myotubes	Mill, R. *et al*. 2018
Murine motor neurons	Murine muscle cells	Southam, K.A. *et al*. 2013
Rat DRG neurons	Rat Keratinocytes	Tsantoulas, C. *et al*. 2013
Mouse DRG neurons	Human mesenchymal stem cell differentiated Osteoblast	Leitão, L. *et al*. 2020
Rat cortical neurons	Rat Oligodendrocytes	Taylor, A. M. *et al*. 2005
Mouse cortical neurons	Mouse microglia	Fujita, Y. *et al*. 2020
Mouse cortical neurons	Mouse astrocytes	Yang, Y. *et al*. 2009 and Higashimori, H. and Yang, Y. 2012
Mouse cortical neurons	Mouse mesenchymal stromal cells and astrocytes	Qian, JY. *et al*. 2016

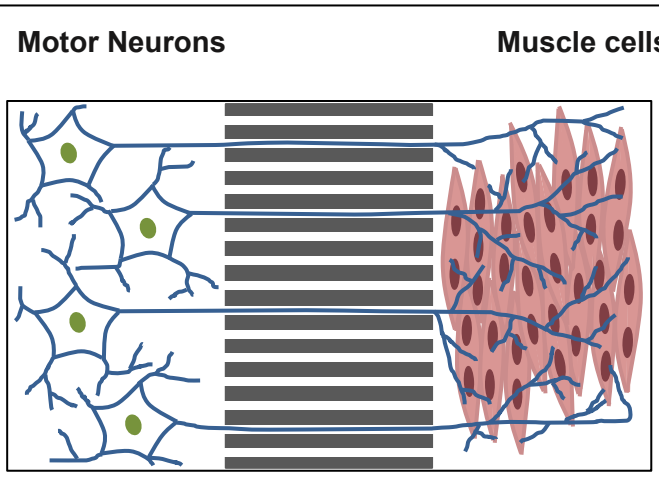

Fig. 1. Schematic representation of co-culturing motor neurons with muscle cells within Xona's devices and chips. Motor neurons grow in one compartment and extend their axons to innervate muscle cells cultured in the adjoining compartment. The microgroove barrier separates the two compartments and allows each compartment to be treated independently.

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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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