

Video Article

# Applying Microfluidics to Electrophysiology

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## Abstract

Microfluidics can be integrated with standard electrophysiology techniques to allow new experimental modalities. Specifically, the motivation for the microfluidic brain slice device is discussed including how the device docks to standard perfusion chambers and the technique of passive pumping which is used to deliver boluses of neuromodulators to the brain slice. By simplifying the device design, we are able to achieve a practical solution to the current unmet electrophysiology need of applying multiple neuromodulators across multiple regions of the brain slice. This is achieved by substituting the standard coverglass substrate of the perfusion chamber with a thin microfluidic device bonded to the coverglass substrate. This was then attached to the perfusion chamber and small holes connect the open-well of the perfusion chamber to the microfluidic channels buried within the microfluidic substrate. These microfluidic channels are interfaced with ports drilled into the edge of the perfusion chamber to access and deliver stimulants. This project represents how the field of microfluidics is transitioning away from proof-of concept device demonstrations and into practical solutions for unmet experimental and clinical needs.

## Video Link

The video component of this article can be found at <http://www.jove.com/video/301/>