Neurite growth into artificial microchannels

Heinz D. Wanzenboeck, P. Schuller*, A. Kocis*, I. Schmied*,
E. Bertagnolli
Vienna University of Technology, A-1040 Vienna, Austria
Heinz.Wanzenboeck@tuwien.ac.at

P. Scholze
Medical University Vienna, Center for Brain Research,
A-1090 Vienna, Austria

Artificial microchannels with microelectrodes have been used to provide topographic guidance to neurites in growing neuronal cell cultures. Nanoimprinting into biocompatible polydimethylsiloxane allowed realizing custom-designed microchannels (Fig.1). The small cross-section excludes nerve cell somata but allows growth of neurites (dendrites, axon). This is a key technique for custom-design of neuronal networks.

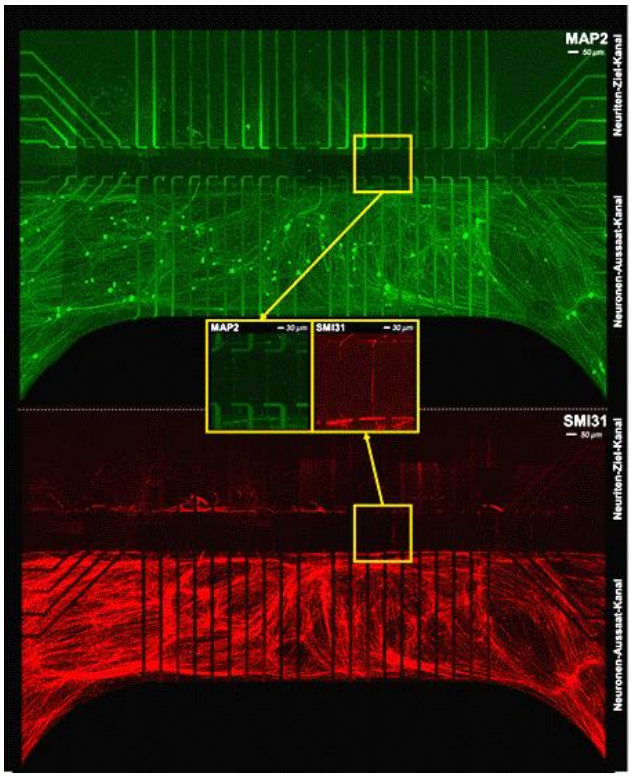

Fig. 1. Fluorescence microscopy images of a neuronal cell culture grown in a microfluidic system. Neurons were seeded in the source macrochannel (bottom) and grown for up to 2 weeks. Due to size exclusion only neurites (and not the larger cell somata) could grow into the small microchannels (mid) and grow to the target macrochannel on the opposite side (top). Neurons were fixed and stained by MAP2 (green image) and by SMI31 (red image). Also the two microelectrodes are visible in the images.