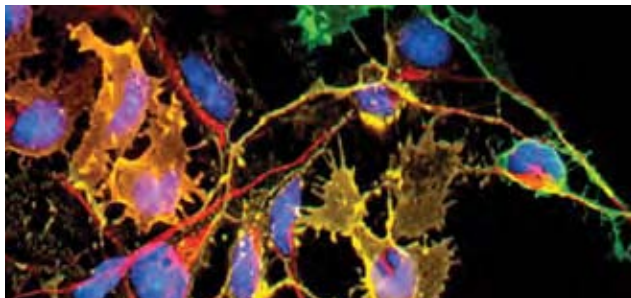


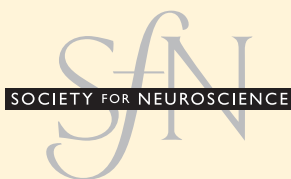


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General Information



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829.16/NN2. Electrical stimulation-induced cell clustering in cultured neural networks

Presentation Time: Nov 7, 12:00 PM : Nov 7, 1:00 PM

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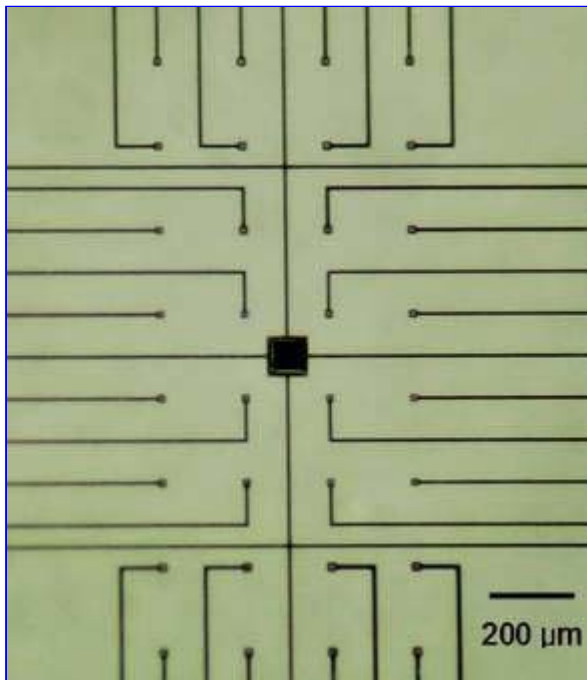
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Presentation Number:829.16

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Keyword:MICROELECTRODE, ELECTRICAL STIMULATION, NEURITE OUTGROWTH, ASTROCYTE, NEURON

Planar microelectrode arrays (MEAs) have been widely used to record electrical activity from neural networks. We have previously demonstrated the use of microcontact printing to produce patterned, functional neural networks on MEAs. However, despite neurons being located on or near all electrodes, action potentials were not always recorded from individual sites. However, only a small number of functional recording sites showed electrical activity. One contributing factor may be that neurons *in vitro* receive insufficient synaptic input to develop into fully functional networks. In this study, electrical stimulation was applied to neurons to mimic synaptic input. Electrical stimulation was applied using an ASIC chip-based current stimulator. Various stimulation paradigms were examined. Both stimulation amplitude and frequency were tailored to prevent cell death. Two effects of stimulation were observed when 3 week-old cultures were stimulated: (i) clusters of neural cells were observed adjacent to stimulating electrodes and (ii) an increase in spontaneous neuronal activity was recorded at stimulating electrodes. Immunocytochemical analysis indicates stimulation can induce both neuron process growth and activation of glial cells. These data indicate that electrical stimulation can be used as a tool to modify neural networks at specific electrode sites and promote electrical activity.



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