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The Chinese Society of Stereotactic and Functional Neurosurgery

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Conjoint Meeting

Neuromodulation: from movement disorders to psychiatric disorders and vegetative state

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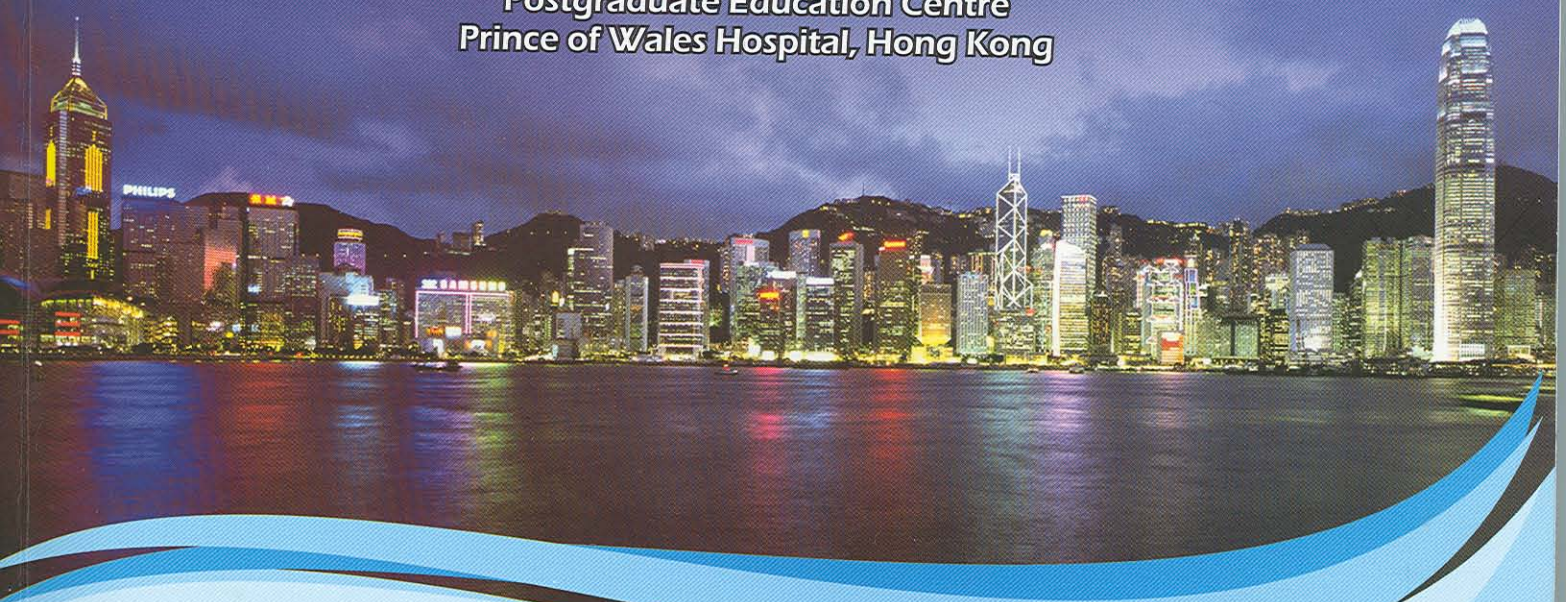

Programme Book

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A NEW, SMALL, MICROFABRICATED CORTICAL STIMULATOR FOR A RAT NEUROPATHIC PAIN MODEL

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[**Introduction**] Conventional commercial brain stimulators include large battery, hard covered package and macro electrodes. Because of huge size of whole system, it is difficult to implant the system into a rat. Here we propose new cortical stimulator which has small microfabricated electrodes, simplified but safe circuit, and wireless communication. The design of multi channel electrodes targets on motor cortex of rat neuropathic pain model.

[**Methods**] New film-type substrate material of electrodes is Liquid Crystal Polymer (LCP) which has low water absorption rate and high mechanical stability. And we selected biocompatible epoxy material for simplified coating of whole implant. For enhanced safety direct current was interrupted on whole nodes in the implanted circuit. We tested the effect of motor cortex stimulation using new film-type 4 channel Pt electrodes on rat models which have neuropathic pain. To generate neuropathic pain efficiently, tibial and sural nerves were completely transected and tightly ligated, while the peroneal nerve was left intact in left hind paw on rat. Two weeks after the surgery, stimulator has been inserted to neuropathic pain rat model each into motor cortex. And one week later, we stimulated and testes the behavior.

[**Results and Discussion**] The Pt patterned LCP electrodes were successfully shaped by microfabrication technology. The electrochemical impedance was measured 1.2kΩ in saline. The integrated circuit was fabricated using 0.35um CMOS technology. We confirmed 4-channel biphasic voltage stimulations using fabricated stimulator. The weight of implant was 1.5g and the thickness of implant was 4mm. The result of animal experiment demonstrates that there can be effects of motor cortex stimulation using new electrodes on neuropathic pain rat model and may suggest an appropriate rodent model for motor cortex stimulation study.