

# Systematic study on the mechanism of generation, maintenance and recognition of neuropathic pain, a model of neural plasticity

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## 【Outline of survey】

Neuropathic pain, a major cause of intractable chronic pain, is triggered by nerve injury. Central sensitization refers to the increased synaptic efficacy established in somatosensory neurons in the dorsal horn of the spinal cord following nerve injury or inflammation. It has been recently proposed that there are striking similarities rather than differences in the molecular mechanisms of synaptic plasticity between spinal central sensitization and hippocampal long-term potentiation. We have demonstrated that nitric oxide (NO) formation by neuronal NO synthase (nNOS) is essential for the maintenance of neuropathic pain and established the quantitative assay system of *in situ* nNOS activity by NADPH diaphorase histochemistry. The present study aims to elucidate the generation, maintenance and recognition of neuropathic pain systematically from molecular biological studies on gene expression and post-translational modification such as phosphorylation, *in situ* analysis of neural circuit in the spinal cord, to *in vivo* imaging of pain in the nervous system by positron emission tomography.

## 【Expected results】

We expect not only the elucidation of molecular mechanism of neural plasticity associated with neuropathic pain from the scientific standpoint but also the development of objective assessment of chronic pain in the clinic, which will provide a strategy of treatment. As the U.S. congress has declared the 10-year period of 2001 through 2010 as “ the decade of pain control and research ” , conquer of pain is an everlasting theme in humans. We believe that the present study will contribute to the reduction of medical expenditure for the elderly as well as to the promotion of the quality of life in rapidly increasing numbers of elderly people in the population of Japan.

## 【References by the principal researcher】

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【Term of project】 FY 2005 - 2009

【Budget allocation】 86,500,000 yen

【Homepage address】 <http://www3.kmu.ac.jp/medchem/index.html>