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### Acupuncture treatment alleviates motor symptoms of MPTP model of Parkinson's disease by decreasing tonic GABA release from reactive astrocytes

Min-Ho Nam<sup>1</sup>, Kwang Seok Ahn<sup>1</sup>,  
C. Junstin Lee<sup>2</sup>

<sup>1</sup> Kyung Hee University

<sup>2</sup> KIST

**Purpose:** Acupuncture has been used as a therapeutic tool in East Asia for over 2000 years. Acupuncture treatment has been shown to be effective for some neurological diseases including Parkinson's disease (PD). Previous acupuncture studies on PD have mostly focused on figuring out how acupuncture protects from toxins such as MPTP. This approach is based on the broadly accepted assumption that neurons in substantia nigra pars compacta (SNpc) are irreversibly degenerated in PD. However, we have recently discovered that astrocytic GABA which inhibits dopaminergic (DA) neurons can induce PD motor symptoms in the absence of neuronal death. Therefore, whether post-acupuncture treatment following MPTP administration can alleviate motor symptoms or not remains to be tested.

**Methods:** Immunohistochemistry, electrophysiology and vertical grid test were used.

**Results:** Here we report that acupuncture treatment at GB34 after 48 hours after MPTP administration significantly reduces astrocytic reactivity and increased GABA release. These changes lead to a significant rescue of DA neuronal firing and release of dopamine in striatum. Consequently, acupuncture treatment alleviates the motor symptoms.

**Conclusion:** Our study provides the first evidence that acupuncture acts through modulation of astrocytic reactivity and gliotransmitter release to alleviate PD motor symptoms.

**Contact:** Min-Ho Nam, [dr.namminho@gmail.com](mailto:dr.namminho@gmail.com)

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### In vitro anti-inflammatory effect of Sinbaro3 pharmacopuncture

Eun-Jee Kim, Min-Jeong Kim, Jae-Woong Lee,  
Jinho Lee, In-Hee Lee

Jaseng Spine and Joint Research Institute, Jaseng  
Medical Foundation

**Purpose:** The anti-inflammatory effect of Harpagophytum procumbens has been well-established in previous studies. The major chemical constituents of Harpagophytum are iridoid glycosides (primarily harpagoside, harpagide, and procumbide). Harpagophytum procumbens is widely used in African indigenous medicine, and use in Korean medicine and phytomedicine is also steadily on the rise for arthritis, neuralgia, poor blood circulation, and rheumatism. "Sinbaro3 pharmacopuncture" is produced with Harpagophytum



procumbens and used to treat degenerative arthritis at Jaseng Hospital of Korean Medicine. This study investigated the in vitro anti-inflammatory effect of Sinbaro3 pharmacopuncture on RAW 264.7 cell line to assess its anti-arthritic effect.

**Methods:** We investigated nitric oxide (NO) concentration, an indicator of inflammation, to evaluate the anti-inflammatory effect of Sinbaro3 in mouse macrophage RAW 264.7 cell line. RAW 264.7 cell line was cultured in DMEM-10 (growth medium with FBS 10%, antibiotic 1%), and an inflammatory response was induced using lipopolysaccharide (LPS) 1 µg/mL, then treated with Sinbaro3 pharmacopuncture at various concentrations (50, 100, 200, 400, and 800 µg/mL) under the hypothesis that Sinbaro3 would inhibit NO production in a concentration dependent manner. We also assessed cytotoxicity of LPS with Sinbaro3 pharmacopuncture through MTT assay to ensure validity of the experiment.

**Results:** RAW264.7 cell line displays higher levels of cell differentiation with greater inflammatory response morphologically, and our results presented greater cell differentiation at lower concentrations of Sinbaro3 pharmacopuncture compared to higher concentrations, indicating concentration dependent NO inhibition. MTT assay results showed that Sinbaro3 pharmacopuncture did not affect cell viability, while the LPS-treated control exhibited 66% viability.

**Conclusion:** Sinbaro3 pharmacopuncture was shown to possess potent anti-inflammatory effects. Further studies will be conducted to determine additional effects and the underlying mechanism of its anti-inflammatory effects using inflammatory cytokines such as IL-6, IL-1β, and prostaglandin-E2.

**Contact:** Eun-Jee Kim, [letmelove57@hanmail.net](mailto:letmelove57@hanmail.net)

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### Optical monitoring of pain relief after electroacupuncture with different stimulation parameters in neuropathic rats

Bae Hwan Lee<sup>1</sup>, Jin-Hun Sohn<sup>2</sup>,  
Myeounghoon Cha<sup>1</sup>

<sup>1</sup> Department of Physiology, Yonsei University  
College of Medicine

<sup>2</sup> Department of Psychology, Chungnam Nat'l  
University

**Purpose:** Injury to the peripheral nerve causes physiological changes in the primary afferent neurons. Pain symptoms associated with peripheral nerve injury may reflect changes in the excitability of the nervous system, including the spinothalamic tract. The present study was conducted to monitor the changes in cortical excitability using optical imaging with a voltage-sensitive dye in neuropathic rats after electroacupuncture (EA) stimulation with different parameters.

**Methods:** Under pentobarbital anesthesia, male Sprague-Dawley rats were subjected to neuropathic surgery with tight ligation and cutting of the tibial and sural nerves of the left hindpaw. Behavioral tests for mechanical and cold allodynia were performed for two weeks after the operation. Then, the rats were re-anesthetized with urethane and the skull was

