

## **Abstract 1 - November 2016**

Yang KY, Kim MJ, Ju JS, Park SK, Lee CG, Kim ST, Bae YC, Ahn DK. Antinociceptive Effects of Botulinum Toxin Type A on Trigeminal Neuropathic Pain. *J Dent Res*. 2016 Sep;95(10):1183-90.

Previous studies have demonstrated that botulinum toxin type A (BoNT-A) attenuates orofacial nociception. However, there has been no evidence of the participation of the voltage-gated sodium channels (Navs) in the antinociceptive mechanisms of BoNT-A. This study investigated the cellular mechanisms underlying the antinociceptive effects of BoNT-A in a male Sprague-Dawley rat model of trigeminal neuropathic pain produced by malpositioned dental implants. The left mandibular second molar was extracted under anesthesia, followed by a miniature dental implant placement to induce injury to the inferior alveolar nerve. Mechanical allodynia was monitored after subcutaneous injection of BoNT-A at 3, 7, or 12 d after malpositioned dental implant surgery. Subcutaneous injections of 1 or 3 U/kg of BoNT-A on postoperative day 3 significantly attenuated mechanical allodynia, although 0.3 U/kg of BoNT-A did not affect the air-puff threshold. A single injection of 3 U/kg of BoNT-A produced prolonged antiallodynic effects over the entire experimental period. Treatment with BoNT-A on postoperative days 7 and 12, when pain had already been established, also produced prolonged antiallodynic effects. Double treatments with 1 U/kg of BoNT-A produced prolonged, more antiallodynic effects as compared with single treatments. Subcutaneous administration of 3 U/kg of BoNT-A significantly inhibited the upregulation of Nav isoform 1.7 (Nav1.7) expression in the trigeminal ganglion in the nerve-injured animals. These results suggest that antinociceptive effects of BoNT-A are mediated by an inhibition of upregulated Nav1.7 expression in the trigeminal ganglion. BoNT-A is therefore a potential new therapeutic agent for chronic pain control, including neuropathic pain.