



Clinical Trial > [Clin J Pain](#). Mar-Apr 2005;21(2):127-32.

doi: 10.1097/00002508-200503000-00003.

Differential effects of neuropathic analgesics on wind-up-like pain and somatosensory function in healthy volunteers

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PMID: 15722805 DOI: [10.1097/00002508-200503000-00003](#)

Abstract

To investigate the effects of gabapentin, carbamazepine, and amitriptyline on temporal summation, simple nociceptive pain, and innocuous touch sensation in healthy volunteers.

A placebo controlled four-way crossover double-blind randomized protocol was followed. Seventeen healthy subjects, male and female, aged 18 to 24, took part. Punctate pain, temporal summation pain to repeat punctate stimulation, and vibration detection threshold were assessed in triplicate. Study drugs were given as bedtime and early morning doses with assessments carried out midmorning.

Gabapentin and carbamazepine significantly reduced the intensity of temporal summation pain ($P < 0.001$ and $P < 0.01$ respectively), whereas amitriptyline significantly increased temporal summation pain ($P < 0.001$). None of the drugs affected pain produced by a single punctate stimulus ($P > 0.05$). Carbamazepine increased vibration detection thresholds ($P < 0.05$), but neither gabapentin nor amitriptyline had any detectable effect on vibration.

We have shown that gabapentin, carbamazepine, and amitriptyline, three pharmacologically different drugs, have distinct and quantifiable effects on somatosensory pathways in healthy volunteers. These findings provide a link between pharmacology of the study drugs and clinical effectiveness. The effects of gabapentin and carbamazepine on temporal summation pain show that these drugs can block centrally amplified wind-up pain in the absence of a neuropathic disorder.

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