

47. EFFECTS OF AMBIENT TEMPERATURE ON CURRENT PERCEPTION THRESHOLD IN PATIENTS WITH NEUROPATHIC PAIN

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Background: Although many observations in both animals and humans suggest that cold environment produce an antinociceptive effect, it is often experienced in a daily pain service that the complaint of patients with persistent pain varies depending on the weather; the pain gets worse in winter. A recent animal study showed low ambient temperature exposure augments abnormalities in pain-related behaviors of neuropathic rats. Possible mechanisms might include that perception threshold in the area of pain reacts differently to a change in ambient temperature. Accordingly, the present study examined the effects of ambient temperature on selective peripheral sensory nerve function in patients with neuropathic pain by measuring current perception thresholds (CPTs) in both painful and painless areas.

Methods: With IRB approval and informed consent, six patients aged 24-78 yr with neuropathic pain were enrolled in the study. All the patients had undergone attempts at treatment before the study. Five patients had post-herpetic neuralgia in the hand, foot, or body trunk. The rest had post-traumatic neuralgia in the hand. None had anything to eat or drink for more than eight hours before the study started at 8:30 a.m. Measurements were performed in a silent room with two different ambient temperatures of 25.0 ± 0.5 degrees C and 8.0 ± 0.5 degrees C on the same day. The humidity was maintained at 35-45%. Patients were dressed in a hospital gown, and rested comfortably in a chair for at least 20 min before the each experiment to adapt to the room temperature. Measurements included CPTs in the area of pain and that free of pain in the same dermatome in the opposite side, blood pressure, pulse rate, skin temperature and the degree of pain using visual analog scale (VAS). CPTs of 2000, 250, and 5 Hz were determined by using the Neurometer CPT/C (Neurotron, Baltimore, MD) with the forced-choice CPT testing mode. Data were analyzed using Student's paired t-test and Wilcoxon signed rank test, where appropriate. $P < 0.05$ was considered significant.

Results: CPTs of 2000 Hz, 250 Hz, and 5 Hz in the area of pain were significantly higher in the warm environment than in the cool environment (table). In contrast, no differences were found in the area free of pain in the opposite side between the two different environmental temperatures. VAS in the cool environment was significantly higher than in the warm environment. There were significant differences in the skin temperature and systolic blood pressure.

Conclusions: The present study showed that ambient temperatures affected CPTs in the area of neuropathic pain but not in the area free of pain. Both large and small diameter sensory nerve fibers became sensitive when environmental temperature was set colder. These results may support our clinical experiences that the complaint by patients with neuropathic pain varies depending on the weather.

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	warm environment	cool environment
2000 Hz painful site (mA/100)	358 ± 262	251 ± 217*
2000 Hz control site (mA/100)	140 ± 78	131 ± 62
250 Hz painful site (mA/100)	114 ± 67	87 ± 62*
250 Hz control site (mA/100)	44 ± 37	39 ± 31
5 Hz painful site (mA/100)	102 ± 75	65 ± 54*
5 Hz control site (mA/100)	27 ± 28	27 ± 22
VAS (mm)	45 ± 18	64 ± 23*
Skin temperature at painful site (degrees C)	34.1 ± 0.8	24.0 ± 3.4*
Skin temperature at control site (degrees C)	34.6 ± 0.48	24.1 ± 3.7*
Blood pressure (mmHg)	112 ± 11	129 ± 13*
Pulse rate (beat/min)	68 ± 12	65 ± 8