	S	AT	PM	NM
OPT (mA mean±SD)	30(±9)	30(±9)	31(±9)	29(±9)
SuPT (mA)	30(±9)	35(±12)*	37(±16)*	32(±13)
SePT (mA)	20(±5)	24(±8)*	24(±7)*	22(±7)
APT (mA)	29(±8)	32(±9)*	35(±12)*	31(±12)
Pain tolerance (s)	23(±16)	28(±17)*	27(±15)*	22(15)

*$p < 0.05$

Music eliciting positive emotions as well as distraction induced analgesic effects probably mediated supraspinaly as the nociceptive spinal reflex was not influenced. Whether music could be used to modulate pain perception in chronic pain patients is still to be determined.

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MODIFICATION OF CORTICAL EVOKED POTENTIALS DURING SURAL NERVE STIMULATION IN FAILED BACK SURGERY SYNDROME PATIENTS TREATED WITH SPINAL CORD STIMULATION

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We analyzed whether cortical processing of cutaneous sural nerve stimuli would be altered by spinal cord stimulation (SCS) in patients with failed back surgery syndrome.

In nine patients (4 women, 5 men, age 39–56 years) suffering from intractable pain in their left leg and back, the left sural nerve was stimulated with 0.2 ms square pulses (13–34 mA) and 5–8 s inter-stimulus intervals. The evoked potentials (111 EEG electrodes), that were recorded during ongoing SCS or in absence of SCS, were modeled using BESA™ (MEGIS, Germany). The source model encompassed four source dipoles located in the following regions: the right primary somatosensory cortex (S1, 87 ms), the left and right secondary somatosensory cortex (S2, 161 and 167 ms, respectively), and the mid-cingulate cortex (314 ms). The source amplitudes of the S1 and of both S2 source dipoles were reduced during periods of SCS compared to periods without SCS ($P < 0.05$). In contrast to the S1 and S2 sources, the amplitude of the mid-cingulate source was increased during SCS ($P < 0.05$). Subjective intensity of sural nerve stimuli, evaluated using visual analogue scale, was not affected by SCS ($P > 0.05$).

While reduced amplitudes of S1 and S2 sources during SCS suggest inhibition of afferent input possibly occurring at segmental level, the increased source activity in the cingulate cortex points to a positive interaction between SCS and the sural nerve stimulation. These cortical activation changes are not associated with subjective intensity measures of the sural nerve stimuli.

Supported by GAUK 66/2005, IGA 8232, RG 0021620816, LC 550 and CNS 1M0517.

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INTENSITY MODULATION OF CUTANEOUS ELECTRICAL STIMULATION: EPS AND SUBJECTIVE RATINGS

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Background and Aims: Chronic pain research is increasingly focused on neuroplastic mechanisms underlying subjective pain experience. Both sensation and cortical representation depend on central modulation of applied stimuli. In multiple mechanisms, both tactile and nociceptive activations interact, indicating that the distribution of activated afferents is relevant for correct interpretation of results. From this perspective, the traditional use of amplitude modulated single electrical pulses (SP) might not be optimal for studying central processing of pain as the amplitude changes this distribution (depending on local fiber densities). Pulse trains (PT) with a variable number of fixed amplitude pulses might be more suitable as they resemble the coding of stimulus intensity by skin receptors. In this study, we compared Numeric Rating Scale (NRS) and evoked potentials (EP) components obtained with SP and PT modulated intensity (I).

Method: A total of 30 healthy subjects were electrically stimulated at the left forearm or middle fingertip. NRS scores and EPs were averaged from 105 randomized stimuli at 5 levels.

Results: Both the I-EP (components) and the I-NRS relationships differed depending on the modulation method and stimulus location. Although the repeatedly reported NRS-EP (N150-P200) correlation was reproduced for SP at the fingertip, no significant correlation was found with stimulation at the forearm. For PT the NRS-EP (N150-P200) correlation was found for both stimulus locations.

Conclusion: These findings support the view that SP and PT offer a different excitation of neural mechanisms, which might be fruitful for future observation of the central mechanisms underlying chronification of pain.

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HABITUATION EFFECTS ON SOMATOSENSORY EVENT-RELATED POTENTIALS (SEPS) ELICITED BY PAINFUL ELECTRICAL STIMULI

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Background and Aims: Pain perception is typically measured by questionnaires and behavioural responses. Somatosensory Evoked Potentials (SEPs), however, provide a direct measure of stimulus processing in the brain. We studied how stimulus repetition influences the SEPs.

Methods: A multi-channel EEG was recorded (band pass 0.1–100Hz, sample frequency 1000Hz) from 11 volunteers. Electrical stimuli were applied to the middle phalange of the left ring finger. Each trial consisted of 30 stimuli (1 s duration); inter-stimulus interval of 4 seconds. Three trials were recorded, corresponding with subjective intensity levels 5 (pain detection), 7 (moderate pain) and 9 (pain tolerance). Electric stimuli thus ranged from 1 to 25 mA. Mean amplitudes were extracted from single EEG epochs at Cz: N1: 115–125 ms, P2: 185–195 ms, N2: 195–205 ms and P3: 250–270 ms.

Results and Discussion: The N1 component of the SEP decreased between the first and second stimulus. The P3 wave decreased slower; over 4 to 5 stimuli.

For the amplitude of the N1 no differences were observed between the three VAS scores. For those of the P3, the amplitudes of the VAS 5 were lower than those of the two higher VAS scores.

The amplitude of the N1 reaching an asymptotic level after the second stimulus in the trains, is consistent with those of many earlier studies [ref: J. Kekoni]. The slow habituation of the P3 component contrasts the sensitization in subjective VAS scores found in a parallel experiment. It will be interesting to study whether this SEP habituation differs between chronic pain patients and healthy volunteers.

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OBJECTIVE MEASUREMENT OF SUBJECTIVE PAIN PERCEPTION BY CONTACT HEAT EVOKED POTENTIALS

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Background and Aims: The method of pain evoked potentials gained considerable accreditation along the last 3 decades regarding its objectivity,