Title: Cortical processing of electrocutaneous stimuli in chronic stroke patients: a relationship with post-stroke shoulder pain.

Cerebral stroke is often associated with changes in cognitive-evaluative and somatosensory functions which may play a role in the development and maintenance of post-stroke pain. The neurophysiological mechanisms underlying these changes may be objectively assessed using cortical evoked potentials (EPs). However, amplitudes and latencies of late EP components (N90, N150, P200, P300) have rarely been investigated in stroke patients. In this study, EPs were evoked in the electroencephalogram using electrocutaneous stimuli at the affected and unaffected hand in stroke patients with persistent post-stroke shoulder pain (PSSP, n=6), pain-free stroke patients (n=14) and healthy controls (N=20). In addition, cognitive (mini mental state exam, MMSE) and somatosensory (clinical examination, quantitative sensory testing) functions were assessed. Stroke was associated with reduced EP amplitudes (N150, P300) and increased EP latencies (N90, N150 and P300). Although MMSE scores were normal, these changes were most likely related to disturbed cognitive-evaluative processes (attention, stimulus discrimination), since they occurred after stimulation at both hands. In addition, PSSP was associated with increased N90 latencies and electrical sensation thresholds at the affected hand (loss of integrity of the ascending somatosensory tract) and with increased P200 and N150-P200 peak-to-peak latencies (reduced perception of stimulus intensity). In conclusion, EPs extended the clinical examination, providing objective information about sensory-discriminative and cognitive-evaluative dysfunctions in stroke patients. In addition, the results implicated that PSSP may be more than ‘simply’ nociceptive shoulder pain and necessitate further investigations of central mechanisms in PSSP.