

# NEUROPHYSIOLOGIC CHARACTERIZATION OF SHOULDER PAIN IN STROKE PATIENTS

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## Abstract

### 1 Background and purpose

Hemiplegic shoulder pain (HSP) is a common complication after stroke. Its etiology however is not well understood. Several clinical conditions have been related to hemiplegic shoulder pain, such as subluxation, adhesive capsulitis, spasticity and central pain. Pain reduction can be obtained with several types of treatment including steroid injections and neuromuscular electrical stimulation. However, it is not clear what peripheral and central neurophysiological mechanisms are in fact treated using these therapies [1-3].

As pain greatly interferes with the patient's well-being and with rehabilitation efforts, it is important to prevent HSP whenever possible. Otherwise, appropriate treatment should be provided in an early stage of HSP development. Neurophysiological characterization of HSP might aid in its prognosis and diagnosis.

This demands tools that assess both the peripheral and central neurophysiological components of the somatosensory and nociceptive systems in the stroke population. Our investigations are aimed at defining these tools, using several methods.

### 2 Methods

First, the methodologies used in previous investigations of post-stroke pain are studied to determine a methodological stepping stone for future neurophysiologic characterization of HSP. Second, a cross-sectional study assesses the somatosensory and pain system in stroke patients with and without chronic HSP and age-matched healthy controls, using several clinical (Semmes Weinstein monofilaments, routine neurological testing) and experimental tools (electrical quantitative sensory testing and evoked potentials). Finally, a prospective study is carried out to determine what tools are suitable for detecting neurophysiological changes in the development and recovery of HSP.

### 3 Results

So far, the main results concern the determination of a methodological stepping stone for future research based on previous research. A survey of the literature investigating somatosensation and nociception in stroke patients with and without pain syndromes showed some striking results. Of the thirty studies that were included, only three investigated HSP. Considering the tools that were used, only a minority of studies used quantitative experimental methods such as quantitative sensory testing (QST) and/or evoked potentials. Furthermore, studies show a great variety in the use of outcome parameters and definitions of abnormal neurophysiology.

### 4 Conclusion

Future research of HSP should start-off with reducing methodological flaws to ensure the interpretability and comparability of studies. Subjective outcome parameters should be reduced. Furthermore, methodological procedures should be standardized. In this, the challenge for biomedical engineers is to develop tools that on one hand objectively and quantitatively assess different components of the somatosensory and nociceptive systems and on the other hand are easily applied in clinical practice.

### References

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