

Master Research Project

Small and Large Fiber Discrimination – Intra-epidermal Electrical Stimulation

Supervisor: Sara Uldry Júlio

PD Dr. med. Martin Schubert

Duration: 3 months

Description: In spinal cord injury as in other pathologies involving neuropathic pain and sensation deficits it is crucial to assess nociception with objective methods. The development of electrophysiological methods to assess the integrity of nociception depends on stimulation modality and implies the recording of brain activity in response to this stimulation (electroencephalography; EEG). In this study we focus on the ascending spinothalamic tract (STT), the main tract for transmitting noxious stimuli receiving its input from small fibers in the skin. Intra-epidermal electrical stimulation (IES) using a concentric triple electrode is known for its clinical potential due to primary small fiber activation [1]. However, it is still debated if and when IES only activates small fibers specific for nociception and when it co-activates large fibers likely leading to the activation of other afferent tracts [2, 3]. We address this question by systematically studying stimulation intensity (nerve fiber recruitment) and various electrical stimulation modalities to determine when large fibers are co-activated by IES.

Training: The study involves the recruitment and measurement of young healthy control subjects. You will acquire knowledge about neurophysiological techniques such as evoked potentials (EP) and electroencephalography (EEG). You will take part in data acquisition, analysis, and discussion of the findings. In addition, you will get the chance to help in building up a follow-up experiment.

Start: Immediately

Contact: sara.uldryjulio@balgrist.ch

Reference:

1. Kaube, H., et al., A new method to increase nociception specificity of the human blink reflex. *Clin Neurophysiol*, 2000. 111(3): p. 413-6.
2. Mouraux, A., G.D. Iannetti, and L. Plaghki, Low intensity intra-epidermal electrical stimulation can activate Adelta-nociceptors selectively. *Pain*, 2010. 150(1): p. 199-207.
3. La Cesa, S., et al., Skin denervation does not alter cortical potentials to surface concentric electrode stimulation: A comparison with laser evoked potentials and contact heat evoked potentials. *Eur J Pain*, 2018. 22(1): p. 161-169.