**3rd semester projects medis/medicin (10 ECTS)**

The project is for module 3.4a) Muscle function or 3.4b) nerve function:

Project title: Improve electrical stimulation-based sensory feedback in amputees

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Background: More than 1 million limb amputations are performed annually worldwide. Most of them are caused by vascular diseases such as diabetes. Existing prostheses feature high movement functionality but lack sufficient sensory feedback, which most patients desire – for instance, feeling the touch of another person’s hand. Electrical stimulation has a high potential to mediate such sensory feedback, but unfortunately, electrical stimulation can be associated with discomfort and occasional pain in amputee patients. This is partly due to the spontaneous discharge of hyperexcitable pain fibers related to both morphological changes as well as the upregulation of sodium channels. An electrical stimulation protocol that increases the preferential activation of non-pain fibers would therefore improve the sensory feedback in amputee patients. More specifically, increasing the pain threshold and/or decreasing the detection threshold would mean that a larger range of parameters would be available for coding of feedback information from prostheses. Previous studies have shown that a long sub-threshold prepulse increases the threshold significantly for pain fibers, compared to large non-pain fibers.

A successful protocol development could not only improve electrical stimulation-based sensory feedback but also improve transcutaneous electrical nerve stimulation, which is an effective therapy to mask discomfort resulting from i.a. Diabetic neuropathic pain or lower back pain.

Aim of Project: This project aims to test an electrical stimulation protocol in healthy subjects by comparing the detection threshold with the pain threshold.

Applied methods: Cutaneous electrical stimulation, which means that a small electrical current will be applied on the skin in order to activate nerve fibers.

Number of groups that can be assigned to this project: 1