Ulf Henning Thiemann

Dr. med.

Post-movement cortical motor processing under temporary deafferentation

Promotionsfach: Kinder- und Jugendpsychiatrie

Doktorvater: Priv.-Doz. Dr. med. Licenciado en psicología (UNED, Madrid) S. Bender

The principal aim of this study had been to gain better insights into motor learning and to characterise mechanisms of cortical motor postprocessing. The central question was, whether motor postimperative negative variation (motor PINV), an early post-movement direct current component over the central area contralateral to the response movement side, would occur in the absence of reafferent somatosensory and proprioceptive feedback.

High resolution EEG was recorded for a simple reaction time task in a sample of healthy adults, while an ischemic nerve block in the form of a tourniquet was applied to the upper arm of the subjects. This was performed to achieve abolishment of reafferent somatosensory and proprioceptive feedback input into the sensorimotor cortex. The effectiveness of the nerve block was evaluated by subjective ratings and clinical neurological examination.

Motor PINV did not only persist under deafferentation of the reafferent feedback, it also depicted intensified activity. Somatosensory and proprioceptive feedback had vanished under ischemia compared to the baseline before application of the nerve block. Motor PINV resembles continuous activation of the motor cortex in the form of a motor memory trace that occurs after the termination of the causing movement. Future research should address questions regarding movement postprocessing and memory encoding and the relevance of motor PINV in a forward model of internal motor control.