

Motor learning – Obstacle avoidance

Purpose of this research project is the investigation of the neuro-physiological mechanisms during learning and performing of a precision locomotor task. The final goal is to improve the rehabilitation strategies of patients with locomotor deficits, such as spinal cord injury. The locomotor task during the experiments consists of repetitively stepping over a suddenly approaching obstacle as closely as possible during treadmill walking. A custom-built machine with a height adjustable obstacle is placed next to the treadmill. When subjects step over the obstacle, the level of foot clearance is determined by infrared sensors. Usually the subjects walk with reduced vision and become informed about the approaching obstacle and task performance by acoustic warning and feedback signals, respectively. On the basis of this task, the motor learning behaviour of different subject groups is investigated, such as young and healthy subjects, elderly, children and patients with Parkinson's disease. Special focus of the research is on the role of reflexes and interlimb coordination during motor learning, since it is known that rhythmic leg and arm movements are controlled in the spinal cord. Several reflexes are evoked by electrical stimulation during the task and their responses are registered by surface electromyography. First results show a facilitation of the nervous system just prior to an obstacle step controlled by the individual's awareness of the specific task.

