Functional electrical stimulation assisted swimming after spinal cord injury

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Résumé

Systems and methods for functional electrical stimulation (FES) supported swimming in SCI people have been investigated. These include the development of a waterproof stimulator, sensors, cables, and electrodes. The crawl stroke is enhanced by timed stimulation of the quadriceps, constant stimulation of the trunk and application of floats to the ankles. An increase of swimming speed by approximately 30 percent could be observed in two complete paraplegic subjects in comparison to crawling without FES support. Further improvements are expected by the synchronization of the artificial knee-extensor activation and the swimmer's arm movements. An inertial sensor at the back below the neck is used to detect the upper body roll motion as an indicator for the arm movements. Aim is to stimulate the leg contralateral to the arm that is currently moving through the water for propulsion. This shall further stabilize the rolling movement of the entire body.

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