
QUANTIFYING LOWER LIMB JOINT POSITION SENSE USING A ROBOTIC EXOSKELETON: A PILOT STUDY.

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ABSTRACT

Clinicians and scientists often focus on tracking the recovery of motor skills after spinal cord injury (SCI), but less attention is paid to the recovery of sensory skills. Measures of sensory function are imperative for evaluating the efficacy of treatments and therapies. Proprioception is one sensory modality that provides information about static position and movement sense. Because of its critical contribution to motor control, proprioception should be measured during the course of recovery after neurological injury. Current clinical methods to test proprioception are limited to crude, manual tests of movement and position sense. The purpose of this study was to develop a quantitative assessment tool to measure joint position sense in the legs. We used the Lokomat, a robotic exoskeleton, and custom software to assess joint position sense in the hip and knee in 9 able-bodied (AB) subjects and 1 person with incomplete SCI. We used two different test paradigms. Both required the subject to move the leg to a target angle, but the presentation of the target was either a remembered or visual target angle. We found that AB subjects had more accurate position sense in the remembered task than in the visual task, and that they tended to have greater accuracy at the hip than at the knee. Position sense of the subject with SCI was comparable to those of the AB subjects. We show that using the Lokomat to assess joint position sense may be an effective clinical measurement tool.

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