Transcutaneous stimulation of the human lumbar cord: Facilitating locomotor output in spinal cord injury

K. Minassian1,2, U.S. Hofstoetter1,2, K. Tansey1,3, F. Rattay1, W. Mayr1, M.R. Dimitrijevic1

1Institute of Analysis and Scientific Computing, Vienna University of Technology, Vienna, Austria; 2Center of Medical Physics and Biomed. Engineering, Medical University of Vienna, Vienna, Austria; 3SCI Research, Shepherd Center, Atlanta, GA; 4Departments of Neurology and Physiology, Emory University, Atlanta, GA; 5Atlanta Veteran’s Administration Medical Center, Atlanta, GA; 6Department of Physical Medicine and Rehabilitation, Baylor College of Medicine, Houston, TX

286.19/AAA20

Tonic transcutaneous stimulation modifies kinetics of voluntary stepping in motor complete spinal cord injury.

Introduction

Recent advances in spinal cord injury (SCI) research have highlighted the potential benefits of non-invasive electrical stimulation for recovering locomotor function. Transcutaneous spinal cord stimulation (TSCS) has emerged as a promising technique for activating and recruiting spinal motor pools, resulting in the elicitation of rhythmic, locomotor-like movements in SCI patients. This research focuses on the modulation of motor output using TSCS and its potential implications for the rehabilitation of SCI individuals.

Methods

The study involved a series of experiments with SCI patients, where TSCS parameters were varied to assess their effects on motor output. The stimulation parameters included different intensities, frequencies, and pulse durations.

Results

The results demonstrated that TSCS can substantially influence voluntary locomotion in SCI, with the ability to generate rhythmic stepping patterns and increase voluntary stepping speed. The study also highlighted the importance of optimizing stimulation parameters for individual patients, as different settings may lead to varied responses in motor recovery.

Discussion

The findings suggest that TSCS has the potential to enhance voluntary stepping in SCI individuals, offering a non-invasive approach to facilitate motor output. Further research is needed to establish the optimal stimulation protocols and to investigate the long-term effects of this technique on motor recovery in SCI patients.