The Effectiveness of FES-Evoked EMG Potentials to Assess Muscle Force and Fatigue in Individuals with Spinal Cord Injury

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Abstract: The evoked electromyographic signal (eEMG) potential is the standard index used to monitor both electrical changes within the motor unit during muscular activity and the electrical patterns during evoked contraction. However, technical and physiological limitations often preclude the acquisition and analysis of the signal especially during functional electrical stimulation (FES)-evoked contractions. Hence, an accurate quantification of the relationship between the eEMG potential and FES-evoked muscle response remains elusive and continues to attract the attention of researchers due to its potential application in the fields of biomechanics, muscle physiology, and rehabilitation science. We conducted a systematic review to examine the effectiveness of eEMG potentials to assess muscle force and fatigue, particularly as a biofeedback descriptor of FES-evoked contractions in individuals with spinal cord injury. At the outset, 2867 citations were identified and, finally, fifty-nine trials met the inclusion criteria. Four hypotheses were proposed and evaluated to inform this review. The results showed that eEMG is effective at quantifying muscle force and fatigue during isometric contraction, but may not be effective during dynamic contractions including cycling and stepping. Positive