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Evaluation of Multi-Session Temporary Anesthesia to Improve Upper Limb Recovery: A Preliminary Analysis in Healthy Subjects

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Background: Traditional therapy routines utilized in the recovery of patients with spinal cord injury suffer from several limitations, including the long duration needed to achieve benefits and the inability to overcome activation of spared muscles. As a result, motor and sensory function almost never reach their full potential for recovery using traditional methods. Temporary functional deafferentation (TFD) is a relatively new and noninvasive technique that can modulate mechanisms of cortical reorganization in patients with spinal cord injury to improve therapy approaches. TFD involves temporarily numbing adjacent ipsilateral muscles to improve motor and sensory outcomes in the target muscle. The purpose of this study is to investigate the effectiveness of a multiple session approach of temporarily numbing the biceps of healthy subjects in improving the sensory and motor functions of the ipsilateral triceps.

Methods: Five subjects were recruited to the study. Enrolled subjects had age ranges of nineteen to twenty-two, and two were male and three were female. After enrollment, baseline measurements of hand and grip strength, dexterity, pinch strength, and triceps strength were obtained by measuring the electrical activity of muscle groups using an electromyograph. Subjects then underwent a three-day exercise regimen targeting the triceps, following TFD of the biceps. TFD was achieved each session by applying lidocaine numbing cream directly to the biceps and covering the cream with tape corresponding to the size of the subject's arm circumference to ensure the integrity of the cream during the numbing process. The lidocaine cream was left on the muscle for fifty minutes to allow sufficient absorption and numbing of the area.

Results: Data analysis is currently underway.

Conclusion: This study implicates the effectiveness of using temporary deafferentation in improving motor and sensory functions and suggests a role for this technique in future therapy routines involving patients with spinal cord injury.