*TACSM Abstract*

# The Effects of Three Post-Activation Potentiation Methods on Muscular Activation of Knee Extensors: A Pilot Study

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ABSTRACT

Post-Activation Potentiation (PAP) is a phenomenon that involves a maximal voluntary contraction that potentiates a subsequent dynamic muscular contraction. Manual Resistance Training has been used to alternative resistance training methods. However, the application of MRT on PAP methods on muscular activation has not been yet studied. **PURPOSE**: To assess the feasibility of three different methods of eliciting PAP in combination with three different resting time periods between the maximal voluntary contraction and the subsequent dynamic activity **METHODS**: Four subjects (1 male and 3 females; mean ± *SD*; age = 21.7 ± .5 years) participated in this randomized crossover pilot design. Subjects performed a general warm-up and dynamic stretching followed by a knee extension maximal voluntary contraction (MVC) test at 90º flexion. Subjects were then randomly placed into three conditions: Traditional PAP (T-PAP), Constant Manual Resistance Training PAP (CMRT-PAP), and Practical Manual Resistance Training PAP (PMRT-PAP). PAP was induced through 4-maximal knee extension contractions. The T-PAP condition used an isokinetic machine at 60 deg/sec; for CMRT condition a custom built device was used to replicate the isokinetic machine through manual resistance provided by a partner; for PMRT-PAP manual resistance was applied by a partner through resisting the shank directly. Following each of the PAP protocols, dynamic muscular contraction was tested on the isokinetic machine using 4 repetitions of the knee extension at 180 deg/sec. Electromyography was used to assess muscular activation of the Vastus Lateralis (VL) and Vastus Medialis; electrodes for the VL were placed at mid-distance between the greater trochanter and the lateral condyle of the femur, whereas the electrode for the VM was placed at 20% of the distance between the anterior iliac crest and patellar tendon. Data were analyzed using the MyoMuscle Noraxon software; data were processed using a band pass: low pass at 10 Hz and high pass at 450 Hz. Raw data were smoothed by root mean squared and rectified by half-wave rectification. Data were then normalized to MVC values for further comparison. **RESULTS**: On average – in comparison to MVC values – during the T-PAP condition subjects increased muscular activation by 164% and 160% on the VL and VM sites, respectively. Similarly, subjects during the CMRT and PMRT increased muscular activation of the VL by 166% and 128%, respectively, and, VM by 158% and 115% respectively. **CONCLUSION**: T-PAP, CMRT-PAP, and PMRT-PAP methods appear to be feasible methods to potentiate muscle activation of the VL and VM during dynamic knee extension. Furthermore, these findings indicate that PAP may be elicited by non-traditional resistance training approaches such as Manual Resistance Training.