

## Effect of Prophylactic Ankle Support on Muscle Latency when Landing from a Height

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The use of prophylactic ankle braces (PABs) has been shown to decrease the frequency of ankle sprain injuries but little is known about their effect on muscle activity during dynamic movements. The purpose of this study was to determine the effects of prophylactic ankle support on muscle latency during a landing task. This was a repeated-measures design, all subjects performed landing trials under three different brace conditions (Unbraced, Active Ankle, Don Joy). The independent variable was brace condition (Unbraced, Braced). The dependent variables were muscle latencies of the tibialis anterior (TA), gastrocnemius (GS), and peroneus longus (PL). Muscle latency was defined as the time (ms) from touchdown to the first motor response. A 2 within factor (muscle group, brace condition) repeated measure ANOVA was used for data analysis. A Bonferroni-Holm post hoc procedure was used to determine significant mean comparisons. Twenty-five subjects (age =  $21.2 \pm 1.7$  yr, ht  $171.53, \pm 11.39$  cm, mass =  $78.4, \pm 19.31$  kg) with no history of hip, knee, or ankle pathologies within the last 6 months participated in the study. Subjects were instrumented for EMG (Therapeutics Unlimited, Iowa City, IA), with silver-silver chloride surface electrodes over the TA, GS and PL muscles. A Kistler (Kistler Instruments AG, Amherst, NY) force plate was used to measure ground reaction forces and was synchronized with EMG to determine the moment of touchdown. Five trials were performed for each test condition. Each subject performed a total of 15 landings from a box 40.64 cm tall. Test conditions were counterbalanced across subjects using a latin square method. The average of 5 trials was used for analysis. All muscle activity was initiated prior to touchdown therefore all values are reported as negative. Descriptive average muscle latencies for the: GS were  $-.315 \pm .072$  ms unbraced,  $-.321 \pm .064$  ms Active Ankle, and  $-.301 \pm .062$  ms Donjoy; TA were  $-.154 \pm .105$  ms unbraced,  $-.175 \pm .100$  ms Active Ankle, and  $-.168 \pm .107$  ms Donjoy; and PL were  $-.295 \pm .058$  ms unbraced,  $-.301 \pm .075$  ms Active Ankle, and  $-.283 \pm .064$  ms Donjoy. There were no significant differences in muscle latencies between conditions. There was a significant main effect for muscle ( $p \leq .05$ ). The GS ( $-.312 \pm .060$  ms) and PL ( $-.293 \pm .058$  ms) activation was significantly earlier than the TA ( $-.166 \pm .09$  ms). The application of either PAB did not effect the activation of the GA, TA, and PL during a single-leg landing task when compared to the unbraced condition. Therefore, the application of a PAB does not alter pre-activation of these muscles prior to landing. As expected, the TA had a significantly shorter pre-activation than the PL and GS.