



## TOPICALGEAR

# Effect of Peripheral Afferent Alteration of the Lateral Ankle Ligaments on Dynamic Stability\*

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**Background:** The sensorimotor influence of the lateral ankle ligaments in muscle activation is unclear.

**Hypothesis:** The lateral ankle ligaments have significant sensorimotor influence on muscle activation.

**Study Design:** Controlled laboratory study.

**Methods:** Muscle-firing characteristics in response to a high-speed inversion perturbation and during gait were assessed in 13 normal subjects. Solutions (1.5% lidocaine or a placebo of saline) were injected bilaterally into the anterior talofibular and calcaneofibular ligaments (1.5 ml per ligament) to alter peripheral afferent influence. Subjects were again tested with the same protocol.

**Results:** The protective response of the anterior tibialis and peroneal muscles during inversion perturbation and mean muscle activation amplitude decreased during running after both injections. After injection, no significant differences were seen for muscle reflex latencies, maximum amplitude, time to maximum amplitude during inversion perturbation, or mean amplitude during walking.

**Conclusion:** The lateral ankle ligaments have a sensorimotor influence on muscle activation.

**Clinical Relevance:** Induced edema from the injected solutions may have altered the sensorimotor influence of the lateral ankle ligaments, thereby inhibiting the dynamic ankle stabilizers. This finding suggests that dynamic stability may be compromised because of swelling after joint injury.

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## CONCLUSIONS

The results of this study failed to demonstrate differences in muscle-firing characteristic between lidocaine and placebo treatment for both dynamic gait activities and during inversion perturbation. The results do indicate that the lateral ankle ligaments play a sensorimotor role as evidenced by the muscle suppression that manifested after the solution injection. Suppressed muscle activity was demonstrated by decreased muscle-firing amplitude during the stance and swing phases of gait activities and the reflexive response of the ankle dynamic stabilizers. Clinically, this result suggests that dynamic stability may be compromised due to swelling after joint injury or injection of fluid.