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# Effect of Balance Training With and Without Subsensory Electrical Stimulation on Postural Stability of Subjects With Stable Ankles and Subjects With Functional Ankle Instability

NATA RESEARCH & EDUCATION FOUNDATION

## GRANT INFORMATION SUMMARY

### PRACTICAL SIGNIFICANCE

Following six weeks of balance training, individuals with functional ankle instability (FAI) may experience improvement in their dynamic balance, with no change in their static balance capabilities.

### STUDY BACKGROUND

Balance training is commonly used in the treatment of functionally unstable ankles because postural instabilities are known to exist following ankle injury. Recently, cutaneous subsensory electrical stimulation (SES) has been used to improve balance in healthy humans and therefore we chose to investigate the potential benefits of this technique in reducing the postural instabilities in individuals with FAI.

### OBJECTIVE

This study examined the effects of balance training with and without SES on static and dynamic postural stability in individuals with FAI.

### DESIGN AND SETTING

Subjects were randomly assigned to a: 1) balance training group (BT); 2) balance stimulation train-

ing group (BS); or 3) control group. Each group contained 20 subjects (10 subjects with FAI and 10 subjects with stable ankles). Training groups performed a variety of single leg balance exercises 5 days/week for 6 weeks. The BS group received cutaneous SES over ankle the muscles and ligaments while training. Single leg stance and single leg jump-landing tests (Figure 1 and Figure 2) were performed prior to the training program, and after the 9th, 19th, and 29th training sessions. Control subjects did not train, but were tested before and after 6 weeks.

### SUBJECTS

Thirty subjects with FAI and 30 subjects with stable ankles.

### MEASUREMENTS

Single leg stance and jump-landing tests were assessed on a force plate using sway velocity and time to stabilization (TTS), respectively, in the anterior/posterior (A/P) and medial/lateral (M/L) directions.

## RESULTS

A/P TTS at time 2 ( $1.69 \pm 0.53$  sec.) and 3 M/L TTS at time 3 ( $1.95 \pm 0.67$  sec.) decreased significantly compared with their respective pretest A/P TTS ( $2.02 \pm 0.78$  sec.) and pretest M/L TTS ( $2.28 \pm 0.92$  sec.) measures for the FAI group ( $P < 0.05$ ). The FAI group's A/P TTS at time 3 and 4, and M/L TTS at time 4 remained shorter than the respective pretest TTS ( $P < 0.05$ ). Sway velocity measures did not improve after training ( $P > 0.05$ ). Cutaneous SES did not influence sway velocity and TTS ( $P > 0.05$ ). Lastly, no change in sway velocity and TTS was observed in the control group after 6 weeks ( $P > 0.05$ ).

## CONCLUSIONS

Application of cutaneous SES for improving static and dynamic postural stability is not apparent. Although improvements in static postural stability may not transpire after 6 weeks of training, clinicians can use balance training to improve dynamic postural instabilities associated with FAI.

### Publication and Presentation List:

Ross SE, Guskiewicz KM. Effect of balance training with and without subsensory electrical stimulation on postural stability of subjects with stable ankles and subjects with functional ankle instability. *Journal of Athletic Training*. 2005 (suppl);40:S50.

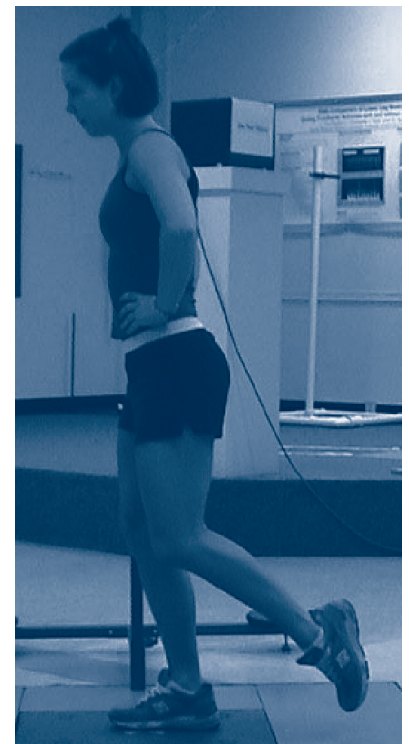
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**Supporting and advancing the athletic training profession through research and education.**



Single Leg Stance Test



Single Leg Jump-Landing Test



**Scott E. Ross, PhD, ATC**  
Principle Investigator

Scott E. Ross is an Assistant Professor and Director of the Athletic Training Education Program at Virginia Commonwealth University, Richmond VA. Scott's primary research interests focus on functional ankle instability and postural stability. Current research includes: 1) The effects of functional ankle instability on postural stability; 2) Effects of functional ankle instability on time to stabilization measures following single leg jump-landings; and 3) Improving postural stability with balance training exercises and stochastic resonance.