Supplementary Digital Content 1:

**Reliability Study of Tendon Stiffness**

Supplementary Digital Content for:

**Effect of Shoe and Surface Stiffness on Lower Limb Tendon Strain in Jumping**

Colin R. Firminger[1,2,3], Olivia L. Bruce[1,3], John William Wannop[1], Darren J. Stefanyshyn[1,2], W. Brent Edwards[1,2,3]

[1]Human Performance Laboratory, Faculty of Kinesiology, University of Calgary, Canada

[2]Biomedical Engineering Graduate Program, University of Calgary, Canada

[3]McCaig Institute for Bone and Joint Health, University of Calgary, Canada

**Corresponding Author:** Colin Firminger

**Mailing Address:** KNB 219, Human Performance Laboratory, University of Calgary, 2500 University Drive NW, Calgary, AB Canada, T2N 1N4

**Phone:** +1-403-808-2601

**Fax:** +1-403-220-2070

**Email:** cfirming@ucalgary.ca

## 1. Protocol

A group of five recreational athletes were recruited to assess the intra- and inter-day reliability of peak AT and PT stiffness using a dynamometry/ultrasound/EMG approach (see *Dynamometry/Ultrasound/EMG Testing*). Participants arrived for testing on two days separated by 24 hours. The time of day of testing was kept constant between days and participants were instructed to avoid exercise between testing sessions. Participants performed two rounds of dynamometry/ultrasound/EMG testing on the first day and one round of testing on the second day. The two sessions on the first day were used to test intra-day reliability, while inter-day reliability was assessed using the first session on day 1 and day 2. Absolute and relative reliability were assessed using a root-mean-square coefficient of variation (RMS-CV) (1) and a single-rating, absolute-agreement, two-way mixed effects intraclass correlation coefficient (ICC) (2), respectively.

## 2. Results

Intra-day RMS-CV values were 4.0% for AT stiffness and 7.3% for PT stiffness. Intra-day ICCs were 0.84 for AT stiffness and 0.90 for PT stiffness, indicating good and excellent relative reliability, respectively. Inter-day RMS-CV values were 3.9% for AT stiffness and 4.4% for PT stiffness, while ICCs were 0.83 for AT stiffness and 0.97 for PT stiffness. These ICCs represented good and excellent relative reliability, respectively, and indicated that the measurement of tendon stiffness was consistent between testing sessions and days. These reliability results are similar to the findings of Fletcher et al. (2010) who reported an ICC of 0.97 for inter-day reliability of AT stiffness measurements (3).

## 3. References


1. Glüer CC, Blake G, Lu Y, Blunt1 BA, Jergas1 M, Genant1 HK. Accurate assessment of precision errors: How to measure the reproducibility of bone densitometry techniques. Osteoporos Int. 1995;5(4):262–70.

2. Koo TK, Li MY. A Guideline of Selecting and Reporting Intraclass Correlation Coefficients for Reliability Research. J Chiropr Med. 2016;15(2):155–63.

3. Fletcher JR, Esau SP, MacIntosh BR. Changes in tendon stiffness and running economy in highly trained distance runners. Eur J Appl Physiol. 2010;110(5):1037–46.