STRIDE-TO-STRIDE FLUCTUATIONS IN INDIVIDUALS WITH ACL-DEFICIENT KNEES COMPARED TO HEALTHY CONTROLS: A CROSS-SECTIONAL STUDY

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INTRODUCTION

- The anterior cruciate ligament (ACL) stabilizes the knee by providing sensory feedback to the central nervous system[1].
- ACL loss impairs stability, **altering joint movement during locomotion**[2,3].
- While healthy gait exhibits complex stride-to-stride fluctuations[4] , ACL deficiency may **disrupt these fluctuations**, as seen in other movement-impaired groups[5].

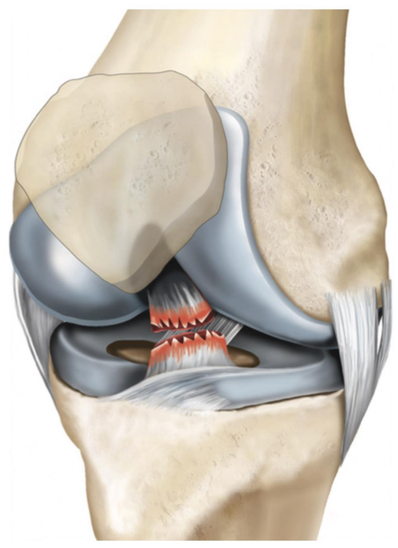

Figure 1. Anterior cruciate ligament injury.

AIMS

To investigate how stride-to-stride fluctuations differ between ACL-deficient individuals and healthy controls.

MATERIALS AND METHODS

Participants:

- 13 athletes with MRI-confirmed ACL deficiency (dACL).
- 13 healthy athletic controls (CON).

Experimental Procedures:

- 12-min treadmill walk at a standardized speed (***Figure 2***).

Data Analysis:

- Inter-stride-intervals' temporal structure (α-ISIs) and magnitude (CV-ISIs) of stride-to-stride fluctuations.

Statistical Analysis:

- Independent samples t-tests were used for group comparisons.

Figure 2. Experimental setup.

Table 1. Participants demographics. Data are presented as Mean ± SD. * $p < 0.05$.

	dACL	CON	*p*-value
Age (y)	23.2 ± 4.28	25.5 ± 7.11	0.326
Height (m)	1.78 ± 0.08	1.72 ± 0.08	0.081
Body mass (kg)	73.3 ± 12.6	65.5 ± 7.84	0.069
BMI (kg/m²)	23.1 ± 2.98	22.1 ± 1.27	0.281
Time post injury (d)	64.6 ± 30.7	-	-

RESULTS

- dACL group exhibited **disrupted α-ISIs of stride-to-stride fluctuations** vs. CON group (***Figure 3***).
- CV-ISIs remained constant across groups.

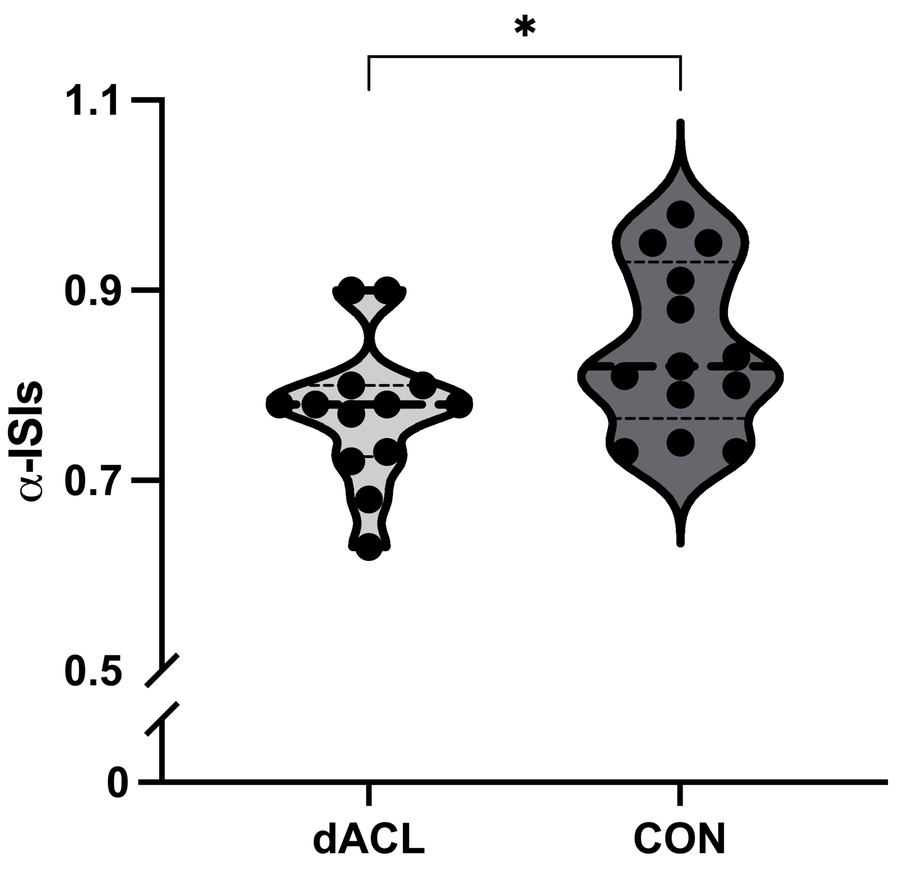

Figure 3. Boxplots of α-ISIs between both groups. dACL – ACL-deficient individuals; CON – controls. * $p < 0.05$.

CONCLUSIONS

- ACL deficiency compromises the natural stride-to-stride fluctuations present in healthy individuals, indicating less adaptable gait patterns.
- Rehabilitation should focus not only on joint stability, but also on restoring movement adaptability – **key for reducing reinjury risk in athletes.**

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