

Journal of Athletic Training

Home For Journal For Authors For Reviewers For Readers For Subscribers For Students Help

Home > [Journal of Athletic Training](#) > [January/February 2010](#) > Sex, Collagen Expression, and Anterior Cruciate Ligament Strength in R...

[Advanced Search](#)

National Athletic Trainers' Association Links

- [NATA Home](#)
- [Online Manuscript Submission and Review](#)
- [Advertising](#)
- [Facts & Figures](#)
- [Editor-in-Chief](#)
- [Journal Editors](#)
- [Editorial Board](#)
- [NATA Position Statements](#)
- [PubMed Central](#)
- [Search PubMed](#)
- [Contact Us](#)

[◀ Previous Article](#) [Volume 45, Issue 1 \(January/February 2010\)](#) [Next Article ▶](#)

 [Add to Favorites](#)  [Share Article](#)  [Export Citations](#)

 [Track Citations](#)  [Permissions](#)

[Full-text](#)

[PDF](#)

Article Citation:

William A. Romani, Patricia Langenberg, Stephen M. Belkoff (2010) Sex, Collagen Expression, and Anterior Cruciate Ligament Strength in Rats. *Journal of Athletic Training*: January/February 2010, Vol. 45, No. 1, pp. 22-28.

doi: 10.4085/1062-6050-45.1.22

Original Research

Sex, Collagen Expression, and Anterior Cruciate Ligament Strength in Rats

William A. Romani, PhD, PT, ATC*, Patricia Langenberg, PhD[†], and Stephen M. Belkoff, PhD[‡]

*MedStar Research Institute, Orthopedic and Sports Health Research, Baltimore, MD

[†]Department of Epidemiology and Preventive Medicine, University of Maryland School of Medicine, Baltimore, MD

[‡]Department of Orthopaedic Surgery, Johns Hopkins University School of Medicine, Baltimore, MD

Abstract

Context: Sex-specific responses to steroid sex hormones have been suggested as a potential cause for the disparate anterior cruciate ligament (ACL) injury rates between male and female athletes. Type 1 collagen (T1C) and type 3 collagen (T3C) are crucial structural components that define the ligament's ability to withstand tensile loads. Messenger RNA (mRNA) is an important mediator of downstream collagen synthesis and remodeling, but the sex-specific mechanisms of collagen mRNA expression and ACL strength are unknown.

Objective: To examine the influence of sex on T1C and T3C mRNA expression and mass-normalized stiffness and peak failure load in the ACLs of skeletally mature rats.

Design: Observational study.

Setting: Basic sciences and biomechanical testing laboratories.

Patients or Other Participants: Nineteen 12-week-old male (n = 9) and female (n = 10) Sprague Dawley rats.

Main Outcome Measure(s): We used real-time polymerase chain reaction to determine T1C and T3C mRNA expression and a hydraulic materials testing device to measure ACL stiffness and failure load. Nonparametric Wilcoxon rank sum tests were used to compare the groups.

Results: Female rats had lower amounts of T3C mRNA expression and higher normalized ACL tangent stiffness and failure load than male rats.

Volume 45, Issue 1
(January/February 2010)

[◀ Previous](#) [Next ▶](#)



[Current Issue](#)
[Available Issues](#)

Journal Information

Print ISSN 1062-6050

eISSN 1938-162X

Frequency Bimonthly:

January/February
March/April
May/June
July/August
September/October
November/December

Register for a Profile

Not Yet [Registered?](#)

Benefits of Registration Include:

- A Unique User Profile that will allow you to manage your current subscriptions (including online access)
- The ability to create favorites lists down to the article level
- The ability to customize email alerts to receive specific notifications about the topics you care most about and special offers

[Register Now!](#)

Related Articles

Articles Citing this Article

[Google Scholar](#)

Search for Other Articles By Author

- William A. Romani
- Patricia Langenberg
- Stephen M. Belkoff

Search in:

Conclusions: These findings suggest that sex-specific differences in T1C and T3C mRNA expression may play an important role in the downstream mechanical properties of the ACL.

Keywords: [knee injuries](#), [women's health](#), [real-time polymerase chain reaction](#)

Address correspondence to William A Romani, PhD, PT, ATC, MedStar Research Institute, Union Memorial Hospital, 201 East University Parkway, 7th Floor, Bauernschmidt, Baltimore, MD 21218. Address e-mail to wromani16@gmail.com.

[top](#) 

Copyright © 2010 **Journal of Athletic Training**. All Rights Reserved, Worldwid
Allen Press, Inc. assists in the online publication of the *Journal of Athletic Trainin*
Technology Partner - **Atypon Systems, Inc**