Medicine & Science in Sports & Exercise
Issue: Volume 40(5) Supplement 1, May 2008, p S41

Publication Type: [C-13 Free Communication/Slide - Bone 1: MAY 29, 2008 8:00 AM - 9:45 AM ROOM: 116]
DOI: 10.1249/01.mss.0000321625.49027.46
ISSN: 0195-9131
Accession: 00005768-200805001-00867

[C-13 Free Communication/Slide - Bone 1: MAY 29, 2008 8:00 AM - 9:45 AM ROOM: 116]

Response of Tibialis Anterior Tendon to a Chronic Exposure of Stretch-Shortening Cycles: Age Effects: 691: May 29 9:30 AM - 9:45 AM

Ensey, James S. BS; Hollander, Melinda S. MS; Wu, John Z. PhD; Kashon, Michael L. PhD; Baker, Brent A. PhD; Cutlip, Robert G. PhD

Author Information
NIOSH, Morgantown, WV.
(Sponsor: Stephen Alway, PhD., FACSM)
Email: jee6@cdc.gov
(No relationships reported)

PURPOSE: The purpose of the current study was to investigate the effects of aging on the ability of tendon to respond to repetitive exposures of stretch-shortening cycles (SSC's). Our general hypothesis was that aging negatively affects the mechanical properties of tendon, while repetitive mechanical loading improves tendon properties in both old and young tendons.

METHODS: The left hindlimb from young (3 mo, N=4) and old (30 mo, N=9) male Fisher 344 x Brown Norway rats were exposed to 80 maximal SSCs (60 deg/s, 50 deg range of motion) 3x/week for 4.5 weeks *in vivo*. After the last exposure, tendons from the tibialis anterior muscle were isolated and stored at -80°C. They were then tested using a micro-mechanical testing machine. Deformation of each tendon was evaluated using relative grip displacements and reference marks via a video system.

RESULTS: Strain at the inflection point was larger in the tendons from the control limbs of the young animals than old animals ($p<0.01$). Strain was also significantly larger in the young control tendons than in the exposed tendons ($p<.05$). At the failure point, the same trend was observed as the inflection point with young control tendons having higher strain magnitude than the young exposed ($p<0.01$) and the old control tendons ($p<.0001$). Total load at inflection was affected by age ($p<0.001$) only. Old exposed and control tendons exhibited significantly higher loads at the inflection point than their young counterparts ($p< 0.05$ for both comparisons respectively). At failure, the old exposed tendons carried higher loads than the young exposed tendons ($p<0.05$). Stiffness was affected only at failure by age where the old tendons exhibited higher stiffness in both exposed and control tendons than their young counterparts ($p<0.05$ and $p<0.01$, respectively).

CONCLUSION: Exposure to the chronic loading protocol decreased the strain to inflection and failure in the young animals. Tendon elasticity also decreased with age. The load capability of tendon increased with age, but exposure to the chronic loading protocol did not affect the load capability, which differed from our initial hypothesis.