

Accepted Manuscript

A proposal to evaluate the fibers' break probability in ligaments and tendons

Marco Bontempi

PII: S0021-9290(17)30183-5

DOI: <http://dx.doi.org/10.1016/j.jbiomech.2017.03.022>

Reference: BM 8173

To appear in: *Journal of Biomechanics*

Received Date: 20 October 2016

Accepted Date: 31 March 2017



Please cite this article as: M. Bontempi, A proposal to evaluate the fibers' break probability in ligaments and tendons, *Journal of Biomechanics* (2017), doi: <http://dx.doi.org/10.1016/j.jbiomech.2017.03.022>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

A proposal to evaluate the fibers' break probability in ligaments and tendons

Marco Bontempi*

^a*DIBINEM, Università di Bologna, via Pupilli 1, I-40136, Bologna, Italy*

^b*Laboratorio di Biomeccanica ed Innovazione Tecnologica, Istituto Ortopedico Rizzoli, via di Barbiano 1/10, I-40136, Bologna, Italy*

Abstract

Understanding the yield and failure mechanisms of ligaments and tendons is important to have a deeper knowledge of their structure and function. Evaluating what are the limits of the human body is also important to prevent injuries in workers, in athletes and the elderly. The tissue yield mechanism was analyzed by modifying and extending a probabilistic model of collagen bundles. Since not usable experimental data are available in the literature, the model and the method were tested using Monte Carlo simulations. The simulations showed many crucial aspects of the model and gave some indications about possible future real validation experiments. The analysis of the correlation between the simulated data, the model (R^2) and the Signal-to-Noise-Ratio (SNR) highlighted the most important parameters that affect effectiveness of the described method: number of fibers, elongation step, noise. This analysis also showed that the numerical differentiation algorithms of the data have a key role on the accuracy of the yield assessment. However,

*Corresponding author. Tel.: +39 051 636 6852; fax: +39 051 583789
Email address: m.bontempi@biomec.ior.it (Marco Bontempi)

Download English Version:

<https://daneshyari.com/en/article/5032000>

Download Persian Version:

<https://daneshyari.com/article/5032000>

[Daneshyari.com](https://daneshyari.com)