New Technology for Measuring Stress in Tendons, Ligaments and Muscles

Published date: March 22, 2017

Technology description

Measuring muscle and ligament stress is crucial in rehabilitative medicine and medical research. Using this data, clinicians and researchers can develop treatment plans and new technologies to improve outcomes and speed recovery.

However, some techniques for gathering this data are highly invasive and involve threading a fiber optic sensor through the tissue or inserting a transducer in the tissue. Current noninvasive procedures are indirect and make assumptions about different tissues to estimate internal stress from external force. UW–Madison researchers have developed a new device and technique for dynamically, noninvasively and accurately measuring longitudinal stress in tendons, muscles and ligamentsin vivo.

The inventors use skin-mounted accelerometers to measure transverse wave speeds in superficial tissues under time-varying loading scenarios. Such wave speed propagation metrics are then used to determine tissue stress based on a wave propagation model.

Additional Information

For more information about improved imaging techniques in tissue analysis, see WARF reference number P140270US01.
http://www.warf.org/technologies/summary/P140270US01.cmsx

Slane L. C., Martin J., DeWall R., Thelen D. and Lee K. 2017. Quantitative Ultrasound Mapping of Regional Variations in Shear Wave Speeds of the Aging Achilles Tendon. Eur. Radiol. 27, 474–482.
Slane L. C., Martin J., DeWall R., Thelen D. and Lee K. 2017. Quantitative Ultrasound Mapping of Regional Variations in Shear Wave Speeds of the Aging Achilles Tendon. Eur. Radiol. 27, 474–482.

Franz J. R. and Thelen D. G. 2016. Imaging and Simulation of Achilles Tendon Dynamics: Implications for Walking Performance in the Elderly. J. Biomech. 49, 1403–1410.
Franz J. R. and Thelen D. G. 2016. Imaging and Simulation of Achilles Tendon Dynamics: Implications for Walking Performance in the Elderly. J. Biomech. 49, 1403–1410.

Application area

Sports medicine and athletic injury
Rehabilitative medicine
Connective tissue diagnostics
Research on tension bearing tissues like tendons

Advantages

Non-invasive
Provides accurate,in vivomeasurements
Enables quantitative rather than qualitative interpretation when diagnosing or treating borderline injuries of muscle and connective tissue
Allows real-time analysis of tissue stress when patients are performing functional tasks like walking, climbing stairs or lifting weights
Will likely ease diagnoses and reduce need for specialized input

Institution

Wisconsin Alumni Research Foundation

Inventors

Daniel Segalman
Laura Slane
Matthew Allen
Jack Martin
Darryl Thelen

联系我们

叶先生

电 话：021-65679356

手 机：13414935137

邮 箱：yeyingsheng@zf-ym.com