Thanks very much for subscribing. Read on for measuring tiny forces and the news round up. You can download a pdf copy of this newsletter here.

RSS

Contents

Microlink used to measure human cell-level forces

Tendons connect muscles to bones. They undergo some of the strongest forces in human body.

Made up of collagen fibres,tendons sit in a matrix of connective tissue. Tendon cells influence the development of the matrix, and the rigidity of the matrix in turn affects the tendon cell behaviour. But it is not well understood in what way. Scientists in Denmark have been investigating the interactions between the cells and the matrix, with the help of a Microlink 751 data acquisition device. Their findings have been published in the Journal of the Mechanical Behavior of Biomedical Materials.

Accumulation of collagen cross-links and stiffening of the matrix occur in diabetes, cancer and ageing. The researchers, led by Antonios Giannopoulos of the Institute of Sports Medicine Copenhagen, have measured the cell-matrix interactions.

To do this they made 3D engineered tendon constructs using human tendon fibroblasts. They also made their own force monitor to non-destructively measure cellular and matrix forces.

The force monitor comprised force transducers, stepper motors with a motor controller, culture wells and a Microlink 751 PC data collection system running Windmill software. The Microlink collected data at 1 sample per second. The sensitivity of the force monitor to detect low scale forces could reveal tiny differences.

Time (s)

Force vs Time Data Measurement, Giannopoulos et al
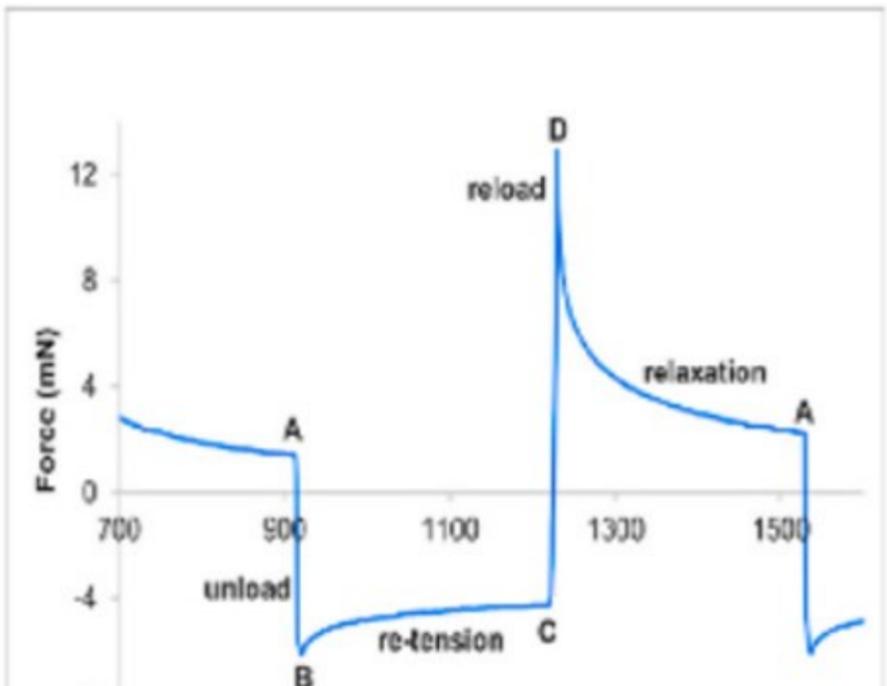
Silk suture loops at the end of each construct were used to attach the force monitor. The tendon constructs were subjected to three unloading/loading cycles. The data from the Microlink was fed into GraphPad software for comparison test analysis.

The authors confirmed the strong correlation between cross-links and matrix properties.

The model provides a useful tool to evaluate tissue's local environment and provides a quantifiable measure of cell-matrix interactions.

Reference and Further Reading

Microlink 751: Multi-Function USB Unit: Voltage, Temperature, Strain, pH, Current, Counting, Control

Journal of the Mechanical Behavior of Biomedical Materials A. Giannopoulos et al, Effects of genipin crosslinking on mechanical cell-matrix interaction in 3D engineered tendon constructs, Journal of the Mechanical Behavior of Biomedical Materials, Volume 119, 2021.

Your Data Acquisition Questions Answered: Reinstalling Windmill

Question

> I am using your ComDebug. I easily installed it on a PC with windows10. Then I accidently uninstalled it. But now, it doesn't let me reinstall it again. It tells me that Windmill is already on this Computer. I thought you might be able to help to overcome this problem.

Answer

> If you accidently delete the Windmill Software, you need to remove its Registry entry before you can reinstall it. To do this:
>
> - In the Windows search box type regedit and choose to run as Administrator. Alternatively select Registry Editor from the Windows Administrative Tools.
> - Back up your Registry in case of mistakes - from the File menu select Export.
> - Go to HK_LOCAL_MACHINE > SYSTEM > CurrentControlSet > Services
> - Scroll down to MLGPIB, right-click it and delete.

You can download ComDebug - which collects data from devices connected over RS232, RS485, Modbus and TCP_IP - from our web site at https://www.windmill.co.uk/serial.html. If you would like a copy of all the Windmill programs, please email monitor@windmillsoft.com.

DAQ News Round-up

Welcome to our round-up of the data acquisition and control news. If you would like to receive more timely DAQ news updates then follow us on Twitter - @DataAcquisition - or grab our rss feed.

Sensor detects damage in pipes
> Low-cost, crystal-based sensor can detect leaks as small as 2 mm in pipelinesm helping save water. The biomolecular piezoelectric device offers a non-toxic and renewable alternative to current commercial

piezoelectric devices, which rely on toxic heavy elements or require heavy processing.
Source: University of Limerick
https://www.ul.ie/

Remote sensing to monitor chimpanzees
Remote sensing data, combined with machine learning approaches, can help to map, characterise and develop further understanding about the habitats of endangered chimpanzees
Source: University of Leicester
https://le.ac.uk/

Laptops imbued with echolocation
Scientists in Glasgow have found a way to equip everyday objects like smartphones and laptops with a bat-like sense of their surroundings.
Source: University of Glasgow
https://www.gla.ac.uk/

Tin gas sensors could help the world tackle the climate crisis
Tin-based gas sensor devices can play an important role in the fight against climate change by monitoring emission sources such as nitrogenous gasses, says Surrey University researchers.
Source: University of Surrey
https://www.surrey.ac.uk/

Scientists reveal new method to study microplastics in the ocean
Their technique uses marine invertebrates called sea squirts or tunicates to detect, count and characterise nanoplastics.
Source: SCUBA News
https://news.scubatravel.co.uk/

Tunicates or Sea Squirts

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monitor@windmillsoft.com.

Windmill Software Ltd, PO Box 58, North District Office,
Manchester, M8 8QR, UK

Telephone: +44 (0)161 833 2782
Facsimile: +44 (0)161 833 2190
E-mail: monitor@windmillsoft.com
https://www.windmill.co.uk/
https://www.windmillsoft.com/