SI-H CT Micro-Tweezer

Mechanical/optical testing of single muscle cell

Micro-Tweezer tip - open

Two Micro-Tweezers, nanomotors, force transducers and front panel of the control box. Complete system also includes two coarse manipulators.

Micro-Tweezer, designed to work with the SI-H product line of muscle testing equipment, allows you to securely hold single muscle fibers (as shown in the image above) without damaging the cells. On one side the Micro-Tweezers are integrated in a highly sensitive force transducer. On the other side the Micro-Tweezer is integrated (via a control box) into a piezo nanomotor (if needed) or a standalone tweezer.

A hollow metal tube with two tapered tweezer tips of custom design in a closed position has a thin, stainless steel rod running through the center of it. When the rod is pushed towards the tip using the control box, the fingers of the tip open to allow the tweezers to grasp the muscle fiber. As the stainless steel rod retracts, the tweezers close and securely hold the fiber.

The unique control box of the Micro-Tweezer, combined with the nanomotor, lets you control the distance between the tweezers. With microscopic cells, you need tweezers that will move as little as a few microns at a time with nanometer precision and stability, and the ingenious SI-H Micro-Tweezers are designed to do just that.

Living cells disintegrate on contact with bare metal, so the Micro-Tweezer are coated with a biologically friendly polymer.

The complete system, including micromanipulators for course movement, can be adapted to an inverted microscope to create an advanced single cell force/length research unit.

Micro-Tweezer

- 20µm tipped jaws
- Remote control open/close
- Flexible mounting on existing micromanipulators

Nanomotor

- Piezo-based movement
- 20nm precision, 200µm travel
- Remote control via analog input

Force Transducer

- KG series type 7A
- 0-5mN, 200pN resolution
- Integrated anti-resonance circuit

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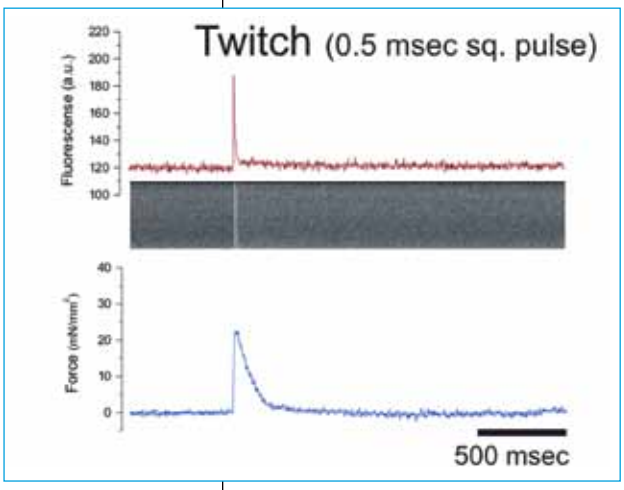
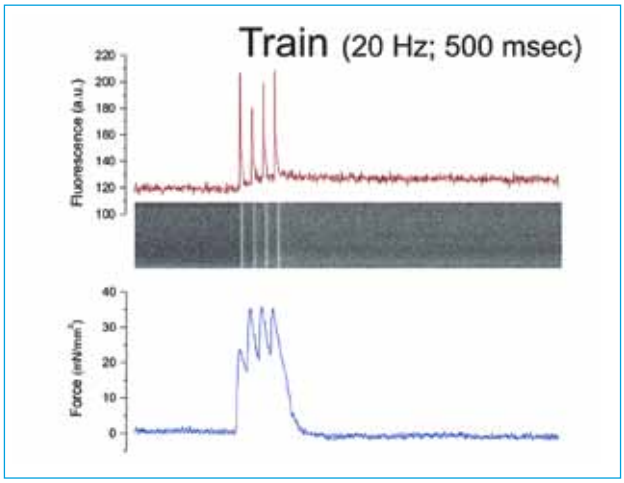
Mechanical/optical testing of single muscle cell

Electrically evoked force and Ca^{2+} transients in single enzymatically dissociated FDB myofibers





- MagFluo4 AM loaded FDB myofibers
- Single intact myofibers mounted between Micro-Tweezer
- Confocal line scan imaging perpendicular to myofiber axis
- Field Simulation

Unpublished data: C.W. Ward and W.J. Lederer, Univ. Maryland Baltimore and Univ. Maryland Biotechnology Institute

Back panel of the MicroTweezer Control Box.

Single muscle fiber held between two Micro-Tweezers

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