

Attach, Stretch, and Measure Force in Cardiomyocytes



Measure shortening and calcium under physiologic load

Measure absolute force from a single myocyte

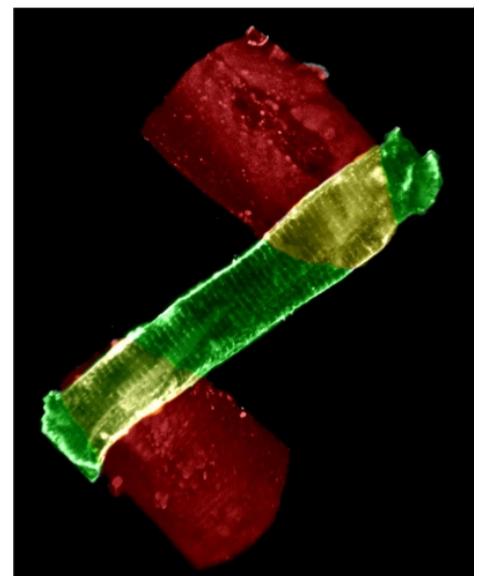
Program stretch, including ramps, pulses, trapezoids, sinusoids

IonOptix MyoStretcher

IonOptix is proud to announce the release of our next generation MyoStretcher System, which now uses our revolutionary new Optical Force Transducer, the OptiForce. Designed specifically for force measurement in cardiomyocytes, it is the most sensitive system on the market for measuring forces from isolated intact myocytes!

We've developed the MyoStretcher with a focus on simplicity, ease-of-use, and reliability. The MyoStretcher includes all of the necessary components to stretch as well as record force in isolated myocytes. In addition to the OptiForce, motorized micro-manipulators, and all component fittings, we also offer an optional piezo-electric translator for programmable stretching and fast-feedback force clamping, and a kit to facilitate attachment of glass rods to the MyoStretcher arms.

The MyoStretcher can be configured as a stand-alone system or as a modular add-on for your existing IonOptix Myocyte Calcium and Contractility System.



Cardiomyocyte labeled with Di-8-ANEPPS (green), attached to two glass micro-rods via MyoTak (red). Photograph courtesy of Dr. B. Prosser, UPenn.

OptiForce

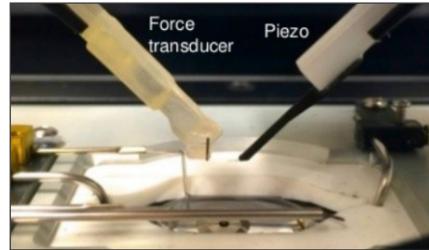
Nanoscopic Optical Force Transducer

- Fast force data sampling rates: 1000Hz
- Frequency response: >7 kHz
- Deflection: sub-micron compliance
- Resolution: <1 nN



Control length with piezo motor:

- Specify controlled length changes as percentage or absolute changes
- Programmable wave to wave amplitude and duration changes



MyoTak Glue

IonOptix MyoTak is a specially-formulated biocompatible adhesive that permits the attachment of cells to surfaces that are smooth or otherwise difficult to adhere to. Developed and patented by researchers at the University of Maryland, IonOptix MyoTak provides a bond strong enough to allow direct force measurements from single primary cardiac myocytes without damaging cell membranes or otherwise affecting cellular physiology (B. Prosser, C. Ward and W.J. Lederer, Science 2011). IonOptix MyoTak will readily coat a variety of materials including carbon fibers (P. de Tombe, unpublished data) as well as glass rods (B. Prosser, C. Ward and W.J. Lederer, Science 2011).

Select Publications

Decreased creatine kinase is linked to diastolic dysfunction in rats with right heart failure induced by pulmonary artery hypertension.

Fowler, E.D., Benoist, D., Drinkhill, M.J., Stones, R., Helmes, M., Wüst, R.C., Stienen, G.J., Steele, D.S. and White, E., 2015. Journal of molecular and cellular cardiology, 86, pp.1-8.

Experimentally increasing titin compliance in a novel mouse model attenuates the Frank-Starling mechanism but has a beneficial effect on diastole.

Methawasin, Mei, Kirk R. Hutchinson, Eun-Jeong Lee, John E. Smith, Chandra Saripalli, Carlos G. Hidalgo, Coen AC Ottenheijm, and Henk Granzier. Circulation (2014): CIRCULATIONAHA-113.

Detyrosinated microtubules modulate mechanotransduction in heart and skeletal muscle.

Kerr, Jaclyn P., Patrick Robison, Guoli Shi, Alexey I. Bogush, Aaron M. Kempema, Joseph K. Hexum, Natalia Becerra et al. Nature communications 6 (2015).