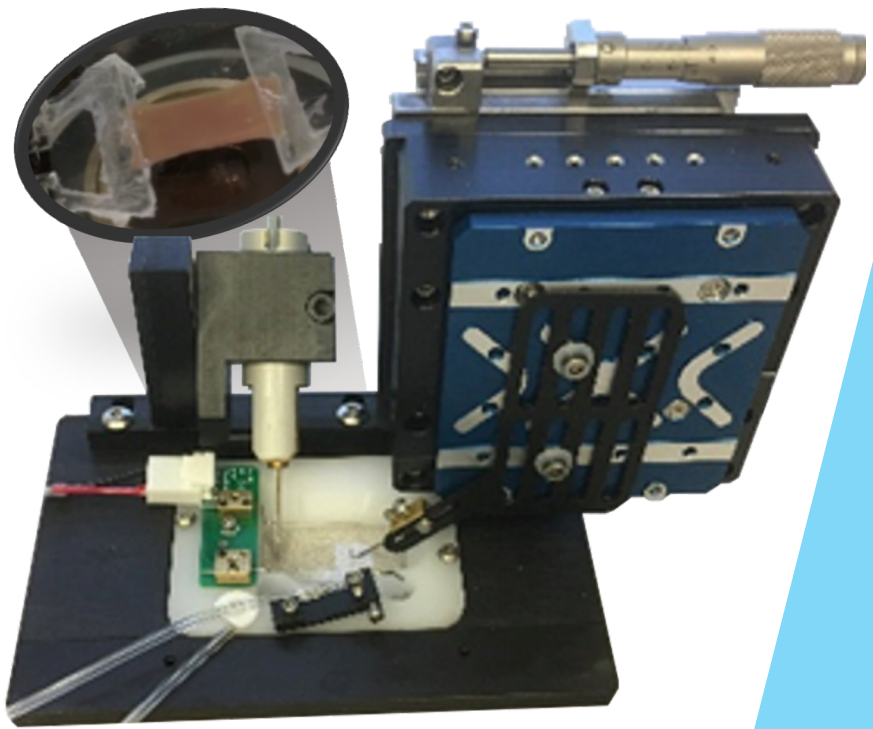
Force, Fluorescence, and Work
Cardiac Slices and Muscle Tissue



Functional data from multiple tissue preps

Easier tissue preparation relative to isolated myocytes

Robust, physiologically relevant preparation

Mechanical work loop data in cardiac tissue

Measure calcium and force simultaneously

MyoClamp System

The IonOptix MyoClamp System provides high-content, functional data from multiple different tissue types including living myocardial slices, papillary muscle, and engineered heart tissue as well as skeletal preparations like soleus and EDL muscle. The system features interchangeable inserts to accommodate various tissue sizes, while also allowing tissue to be field stimulated via parallel platinum electrodes or stimulated via direct electrical excitation.

Thin slice preparations can be easily affixed to sturdy, stable clips that mount between a robust force transducer and programmable length controller, or via simple platinum "Omega" clips tied to the muscle and slipped onto the platinum hooks of the force transducer and motor. The MyoClamp System's Intact Muscle Chamber allows fluid flow for temperature control and continuous oxygenation of tissue, ensuring consistent and reliable data acquisition.

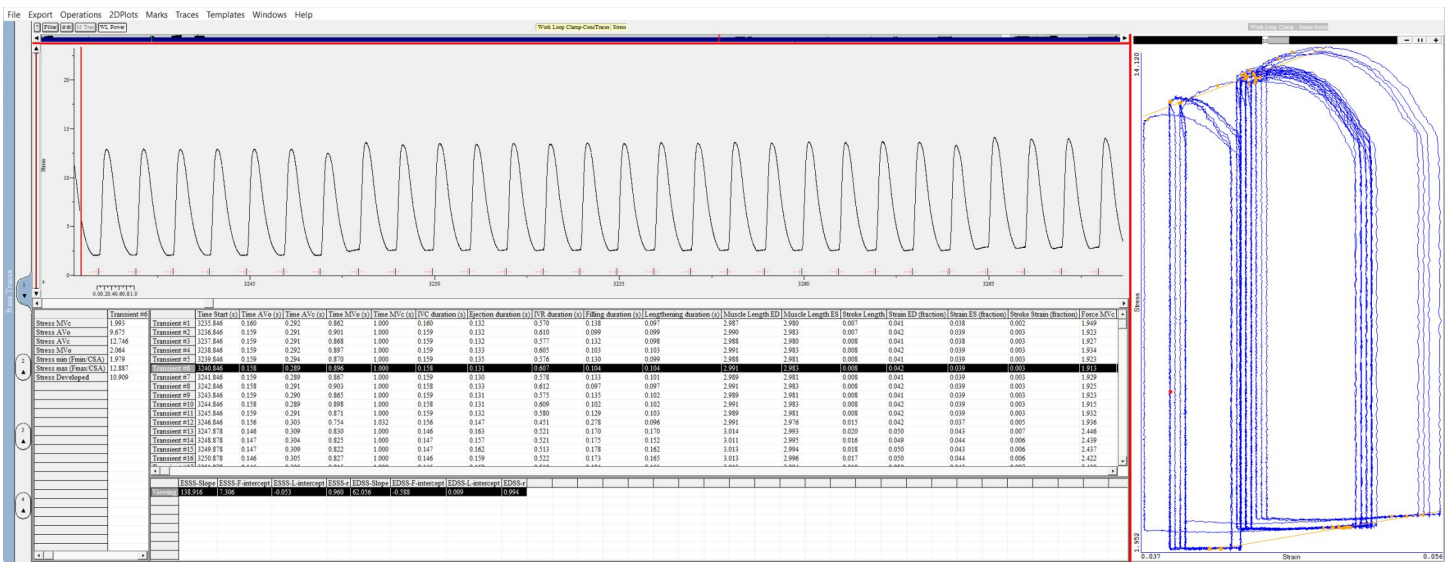
The platform can be used as a benchtop unit or, thanks to our chamber's optically transparent bottom, mounted atop the stage of an inverted microscope for imaging. When combined with the IonOptix Calcium and Contractility System, fluorescence of quantitative, ratiometric dyes such as Fura-2 and/or CalRed can be detected using IonWizard, also permitting control of experiment acquisition parameters and comprehensive data analysis. Resting sarcomere length can also be detected in thin tissue preparations (a useful method to set cardiac tissue preload tension).

Features

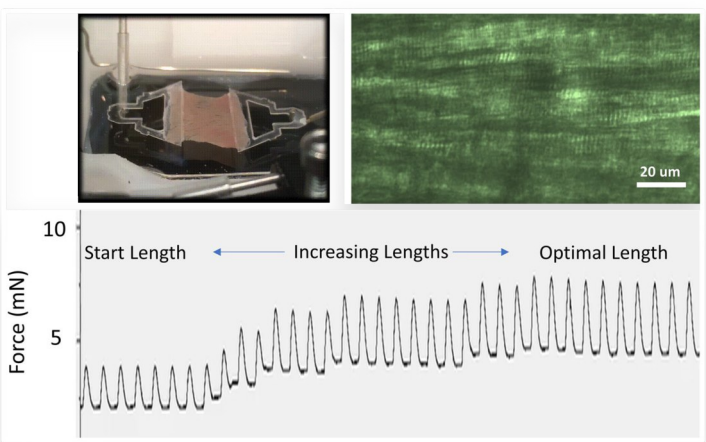
- Measure calcium and force simultaneously in primary and engineered muscle tissue
- Acquire mechanical work loop data in cardiac preparations, including living myocardial slices
- Characterize cardiac tissue elastance and compliance
- Analyze mechanical work and power
- Control pre- and afterload force to model systolic and diastolic changes (including early vs. late diastole)
- Optional Campden Instruments 9000SMZ precision vibratome

Specifications

- Sensitivity range: 0.015-200 mN
- Force transducer frequency response: 750-850 Hz
- Motor range: -2.5 to 2.5 mm (20 nm resolution)



Work loop acquisition with increasing afterload (stress and analysis shown)



Palmer and Bell, Frontiers in Physiology (2022)

Optional Campden Instruments vibratome