

# Electromechanically Stimulate Cells in Culture



Induce and maintain cardiomyocyte phenotype

New user-friendly software

New C-Stretch for simultaneous stretch and stimulation

Customizable protocols to mimic physiological conditions

## IonOptix C-Pace EM

The C-Pace EM is a multi-channel culture stimulator capable of delivering electrical stimulation or a combination of electrical stimulation and mechanical stretch to up to eight tissue culture plates or C-Stretch electromechanical devices simultaneously. Chronic electrical stimulation has been shown to prevent dedifferentiation of cardiomyocytes and maintain their rod shaped, striated morphology, while electrostimulation coupled with mechanical stretch offers a powerful tool to promote maturation of naive cell lines.

## C-Pace Navigator

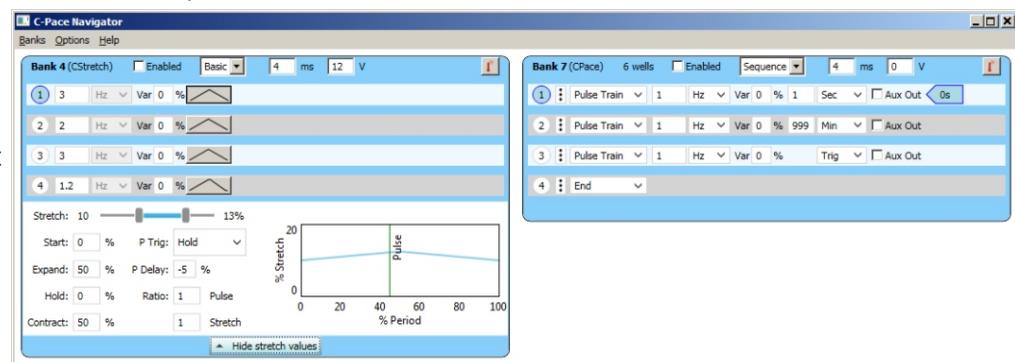
The new C-Pace Navigator software allows the user to operate both the C-Dish and C-Stretch with a user-friendly interface.

- Simple adjustments of both stretch and electrical parameters for each channel
- Pre-defined basic protocols for simple pacing procedures
- Adjustable **trapezoidal waveform** with expansion, hold, and contraction phases
- Customize specific protocols to mimic exercise routines or pathogenic conditions:

**Arrhythmia Protocols** – Insert an offbeat pulse at a fixed interval

**Exercise Protocols** – Run multiple pulse trains with programmable frequency and duration

**Irregular Pacing** – Percent defined random variation of specified frequency



## C-Dish: For Electrostimulation

- Physically stable 2-piece assembly that is adapted for a variety of standard culture plates
- Carbon electrodes + bipolar pulses minimize electrolysis byproducts
- Digital adjustment of frequency (0.010 to 99Hz), pulse duration (0.4 to 24 msec) and voltage (max  $\pm 40$  V)

### Supported Culture Plates

- Rectangular 4 and 8-well plates
- Circular 6, 12, and 24-well plates
- Discrete 35mm dishes



## C-Stretch: For Electromechanical Stimulation

- Fully customizable trapezoidal waveform with adjustable expansion, holding and contraction phases
- Digital adjustment of frequency (up to 10 Hz), pulse duration (0.4 to 24 msec) and voltage (max  $\pm 40$  V); maximum stretch 20%
- Program stimulus pulse to occur at any time during stretch protocol



## Select Publications

**Mechanical Stress Conditioning and Electrical Stimulation Promote Contractility and Force Maturation of Induced Pluripotent Stem Cell-Derived Human Cardiac Tissue.**

Ruan, Jia-Ling, et al. *Circulation* (2016): CIRCULATIONAHA-114. DOI: 10.1161/CIRCULATIONAHA.114.014998

**Mechanical Stress Promotes Maturation of Human Myocardium From Pluripotent Stem Cell-Derived Progenitors.**

Ruan, Jia-Ling, et al. *Stem Cells* 33.7 (2015): 2148-2157. DOI: 10.1002/stem.2036

**Direct Cardiac Reprogramming: From Developmental Biology to Cardiac Regeneration.**

Li Qian and Deepak Srivastava. *Circulation Research*, 113, 915-921 (2013). DOI: 10.1161/CIRCRESAHA.112.300625

**Growth of Engineered Human Myocardium With Mechanical Loading and Vascular Coculture**

Nathaniel L. Tulloch, et al. *Circulation Research* 109, 47-59 (2011). DOI: 10.1161/CIRCRESAHA.110.237206