

xCELLigence RTCA ePacer



Enabling Functional Maturation of hiPSC
Cardiomyocytes Using Directed Electrical Pacing

How Mature Are Your Human Induced Pluripotent Stem Cell Cardiomyocytes?

Human-induced pluripotent stem cell cardiomyocytes are actively utilized in the academic and biopharma industries for safety/tox assessment, drug discovery, and investigation as cardiac disease models. The biggest gap in the field for full adoption of these cells are their inherent immature characteristics.

A number of natural engineering approaches attempting to enhance the structural and functional maturity of hiPSC-CM's have been described in literature, including co-culture, mechanical conditioning, use of ECM substrates with different degrees of stiffness, and electrical pacing.

Efficient propagation of electrical signals is a crucial aspect of the cardiomyocyte developmental program and functionality. The xCELLigence RTCA ePacer is designed to use a natural development program of *in vivo* stimuli for cardiomyocyte "maturation" in a consistent, tunable, scalable, and high-throughput manner that is compatible with different types of relevant readouts.



xCELLigence® RTCA ePacer

An innovative solution for maturing human iPSC Cardiomyocytes into a more predictive model for drug discovery, safety pharmacology, and cardiac disease research



TUNABLE

The ePacer enables precise control of the beating rate over different time durations, improving the functionality of hiPSC Cardiomyocytes and their response to inotropic compounds

SCALABLE

Simultaneously pace your cells from just a few wells up to 6 microtiter plates for more high-throughput experiments

CONSISTENT

Highly controlled pacing conditions result in consistent data across different plates and different experiments

FLEXIBLE

Compatible with different types of relevant workflows, such as calcium measurements, high content microscopy, voltage sensitive dyes, and plate readers.

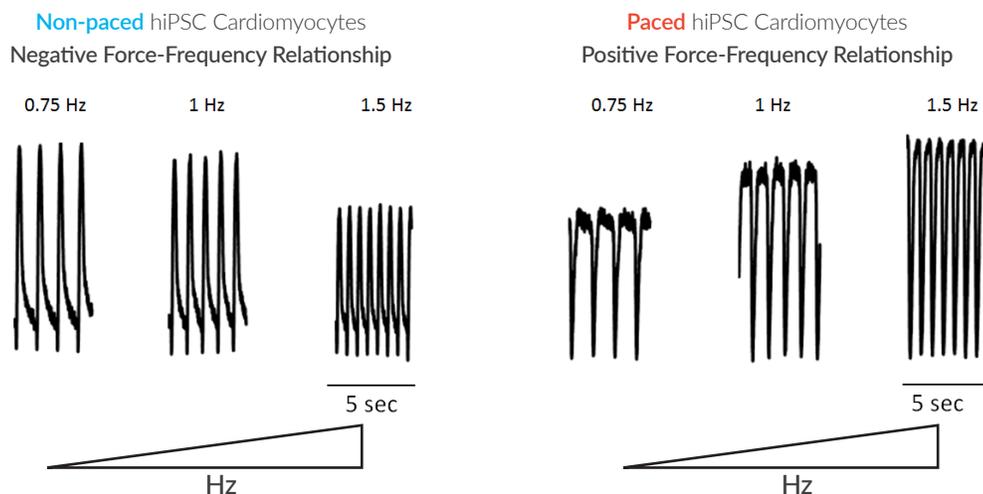


Figure 1: hiPSC cardiomyocytes display a negative force-frequency relationship (left panel) which is reversed by long-term electrical pacing using the ePacer (right panel)

Functional Maturation

The xCELLigence RTCA ePacer provides an easy and effective way to produce functionally mature hiPSC cardiomyocytes. Under precise and consistent electrical pacing conditions, the ePacer improves the maturation status of the hiPSC cardiomyocytes in just 2-3 weeks, without any detectable toxicity or stress to the cells.

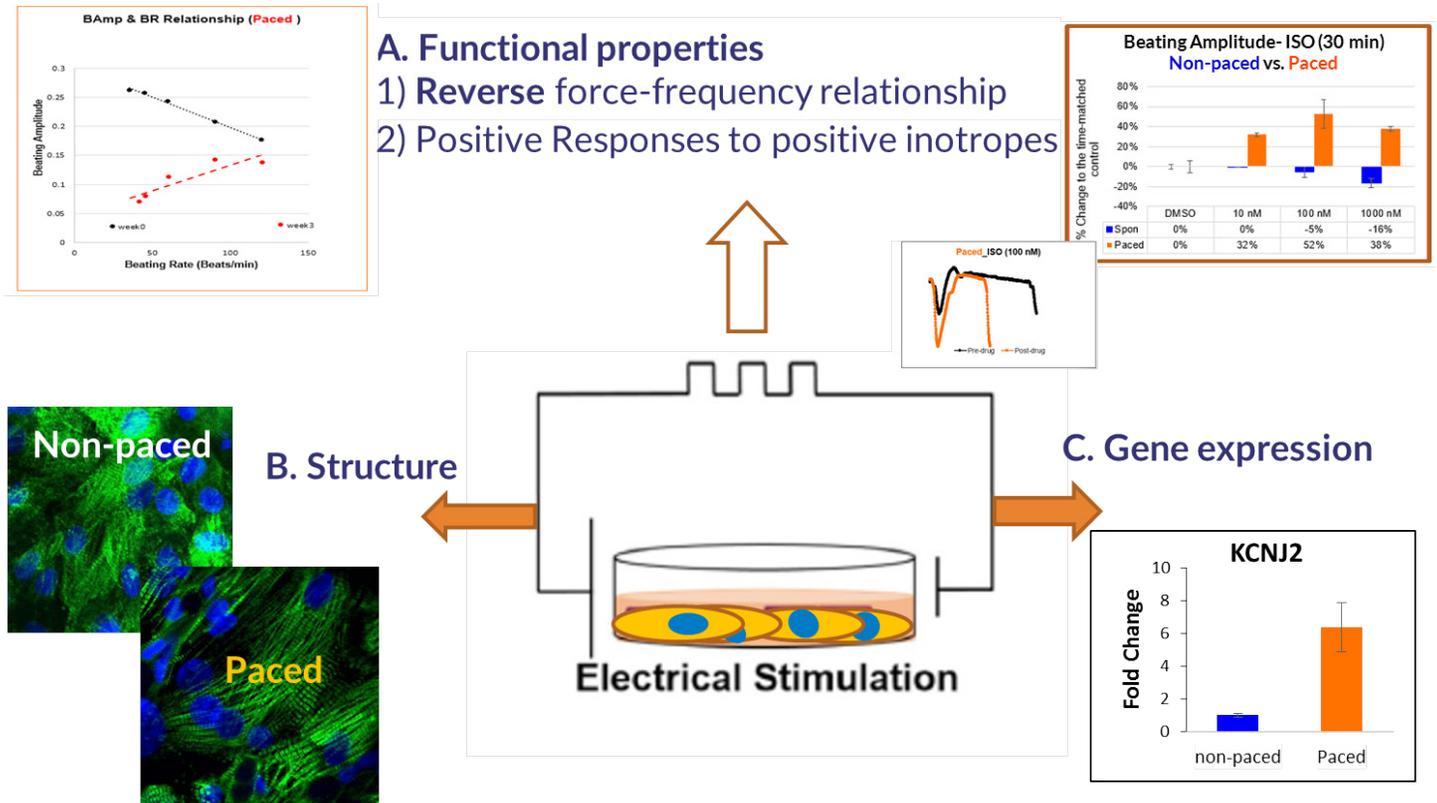
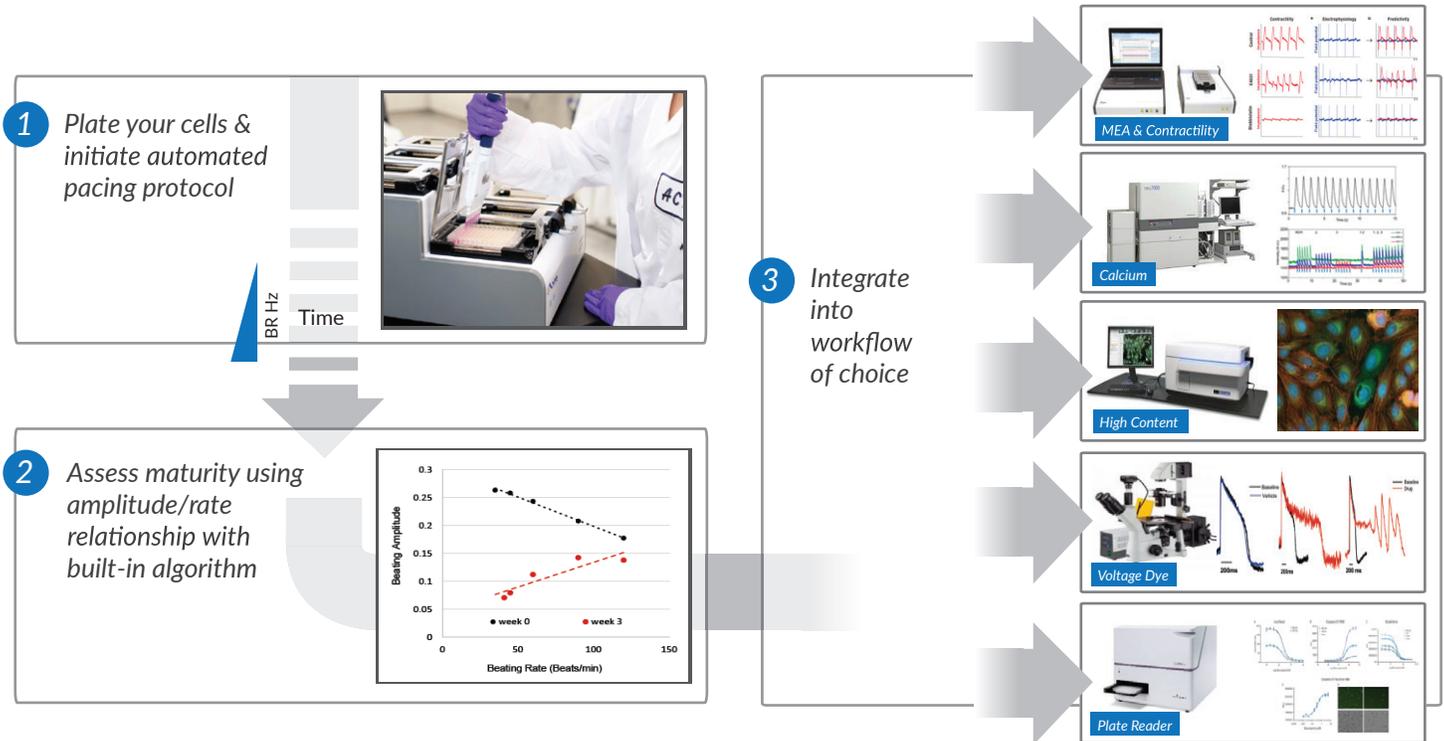


Figure 2: After being subjected to directed progressive electrical pacing using the xCELLigence RTCA ePacer, the hiPSC cardiomyocytes were able to demonstrate A. positive force-frequency relationship and appropriate contractile responses to inotropes; B. significantly improved organized sarcomere structure; and C. proper gene expression.

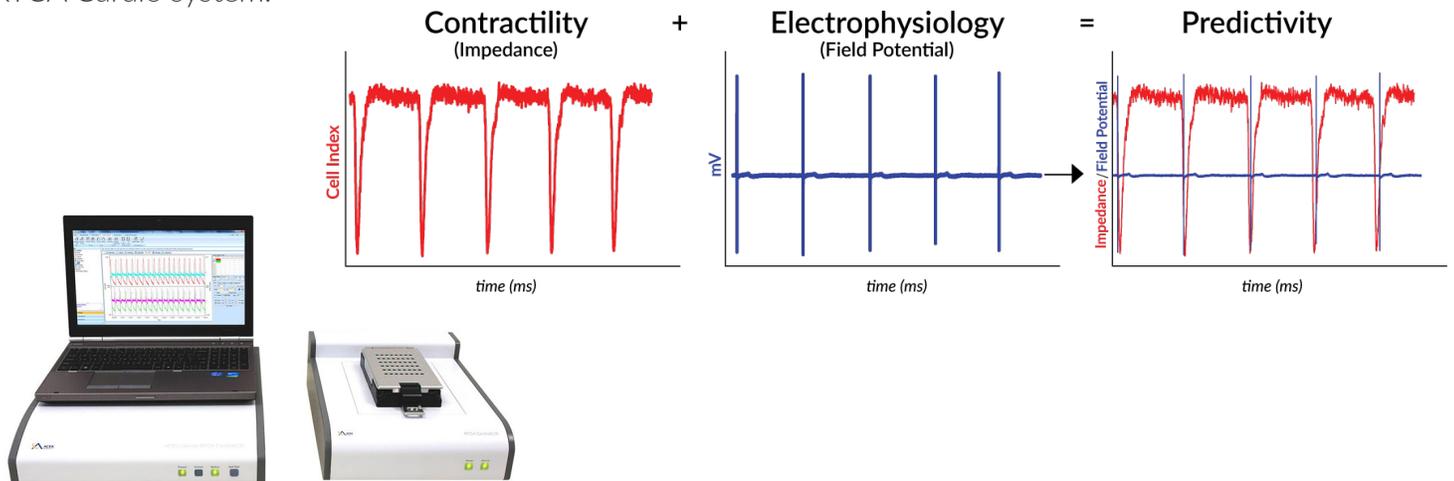
Integrate into Your Existing Workflow

The xCELLigence RTCA ePacer is adaptable and can easily integrate into your existing assay workflow. The view area on the E-Plate Cardio View 96 allows for integration of paced cells with other optical assays.



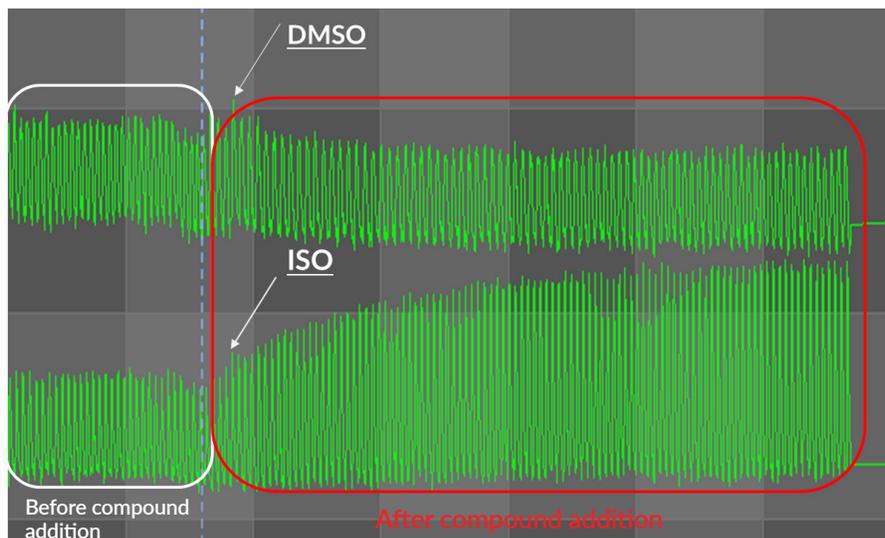
MEA & Contractility

After being subjected to long-term electrical pacing on the xCELLigence RTCA ePacer, contractile and electrical responses of the hiPSC cardiomyocytes can be assessed using the xCELLigence RTCA CardioECR system; alternatively, the contractile responses can be evaluated using the xCELLigence RTCA Cardio system.



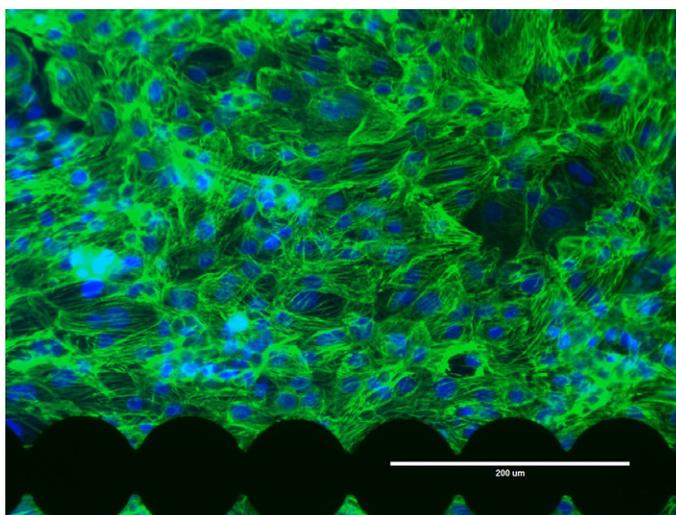
Calcium Transient Measurements

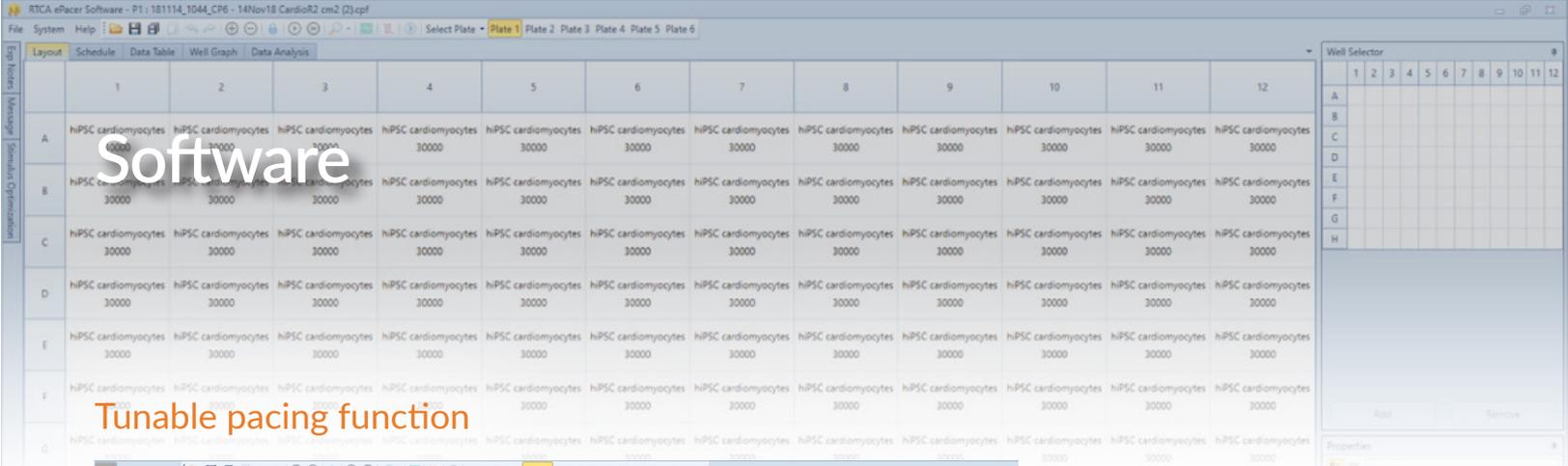
After long-term electrical pacing using the xCELLigence RTCA ePacer, iCell® Cardiomyocytes² were preincubated with Ca²⁺ dye and buffer for 1 hour. The Ca²⁺ signals were then measured using the Hamamatsu FDSS/μCELL before and after DMSO and ISO addition.



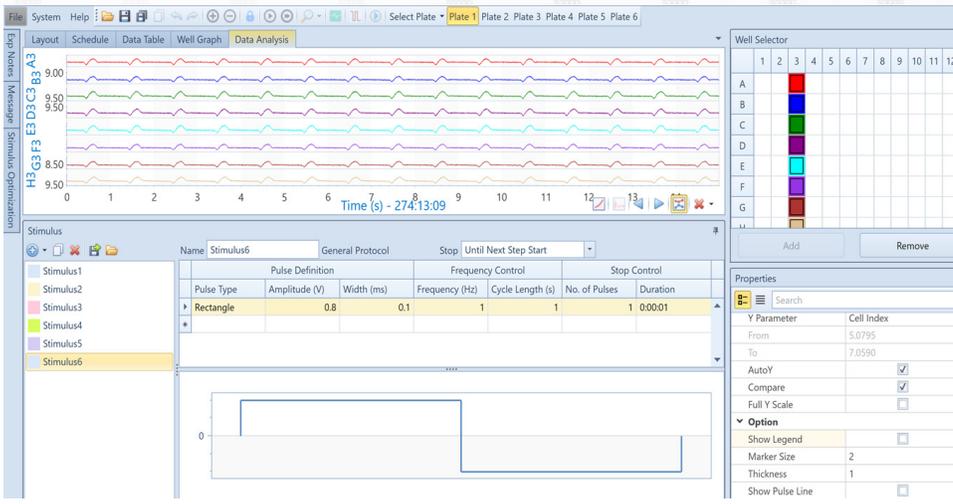
High-Content Imaging

After being subjected to a long-term electrical pacing using the xCELLigence RTCA ePacer, iCell Cardiomyocytes² were immunostained for cardiac troponin C (green) and nuclei (blue) right on the E-Plate® Cardio VIEW 96. The image (20X) was obtained using ImageXpress® Micro confocal.



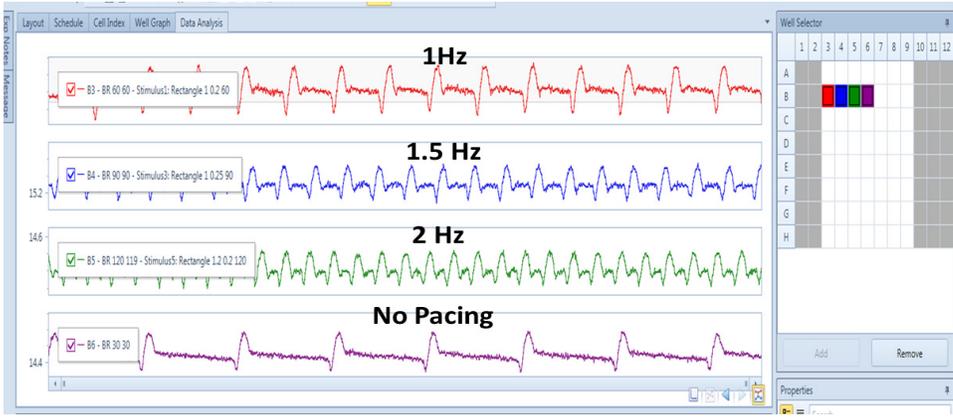


Tunable pacing function



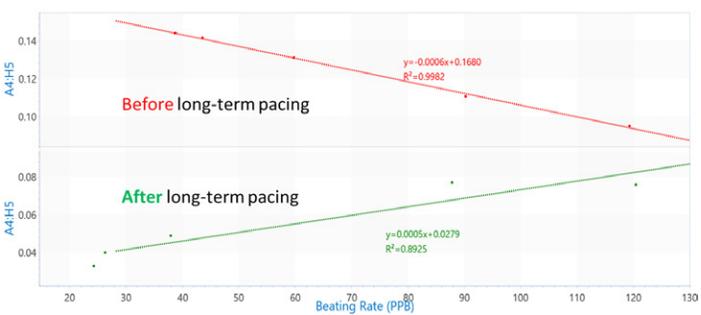
Stimulus settings, such as pulse type, pulse intensity, pulse length, and stimulation duration can be easily selected and defined by the user.

Independent pacing settings for individual columns and plates



Stimulus settings can be applied based on individual columns or across different plates.

Quick and easy way to evaluate cell maturation status using force-frequency relationship calculation



The built-in algorithm automatically generates force-frequency relationship curves before and after long-term pacing process.

Ordering Info

Product	Cat. No.
xCELLigence RTCA ePacer – Bundle (complete system)	
xCELLigence RTCA ePacer Analyzer	00380601520
ePacer Station with 6 Cardio Cradles	00380601530
ePacer Station with 6 CardioECR Cradles	00380601540
ePacer Station with 3 Cardio Cradles and 3 CardioECR Cradles	00380601550
ePacer Station-Customer Configuration	00380601560
E-Plate Cardio 96 (6 plates)	00300601050
E-Plate Cardio 96 (36 plates)	00300601060
E-Plate Cardio View 96 (6 plates)	00300601080
E-Plate Cardio View 96 (36 plates)	00300601090
E-Plate CardioECR 48 (6 Plates)	00300601110
E-Plate CardioECR 48 (36 Plates)	00300601120



get in touch:
OLS OMNI Life Science GmbH
Germany, Austria +49-421 27 61 69-0
info@ols-bio.de | www.ols-bio.de
Switzerland Freecall 0800 666 454
info@ols-bio.ch | www.ols-bio.ch

Corporate Headquarters

ACEA Biosciences, Inc. - A part of Agilent
6779 Mesa Ridge Road, Suite 100
San Diego, CA 92121

Phone | 858.724.0928
Fax | 858.724.0927
Toll-free | 866.308.2232
www.aceabio.com

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