

The CardioExcyte 96 SOL

Optogenetics meets cardiac safety

- Integrates seamlessly with the CardioExcyte 96 and FLEXcyte 96
- 96 channel optical stimulation
- Spatially uniform stimulus allows mechanistic insights into contractility and electrophysiology of iPS cardiomyocytes
- No stimulus artifacts
- Pacing without electrical stress for cells, allowing long-term stimulation during maturation cycles

CardioExcyte 96 SOL

Optical stimulation and investigation of impedance, extracellular field potentials or contractility in parallel

The CardioExcyte 96 is a hybrid device supporting highly resolved impedance-based measurements, MEA-like extracellular field potential (EFP) recordings and true contractility (FLEXcyte 96 Add-On)). It has a small footprint and allows for fully automated recordings from 96 wells in parallel. With embedded control electronics and sophisticated sensor technology, the CardioExcyte 96 is a turn-key system for efficient measurements of beating networks of e.g. iPS cardiomyocytes.



The stimulating optical lid, CardioExcyte 96 SOL, uses LEDs for spatially uniform stimulation of cells transfected with light-gated ion channels such as Channelrhodopsin2 (ChR2).

Optogenetics

After transfection of iPS cardiomyocytes with ChR2 the cells were stimulated by blue light. Every flash of light induces a depolarization of the cells and thus an action

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potential is triggered. The advantages of optical stimulation over electrical stimulation include the highly precise timing, all cells of the beating network are stimulated exactly at the time of the light stimulus. In contrast, electrical stimulation propagates from the electrode across the well and thus cells are stimulated progressively. A mean beat calculation of precisely timed beats enables in-depth compound analysis and concentration response dependencies to be obtained. This is one of the key software capabilities of the CardioExcyte Control/ DataControl software package that is provided with each CardioExcyte 96 system.



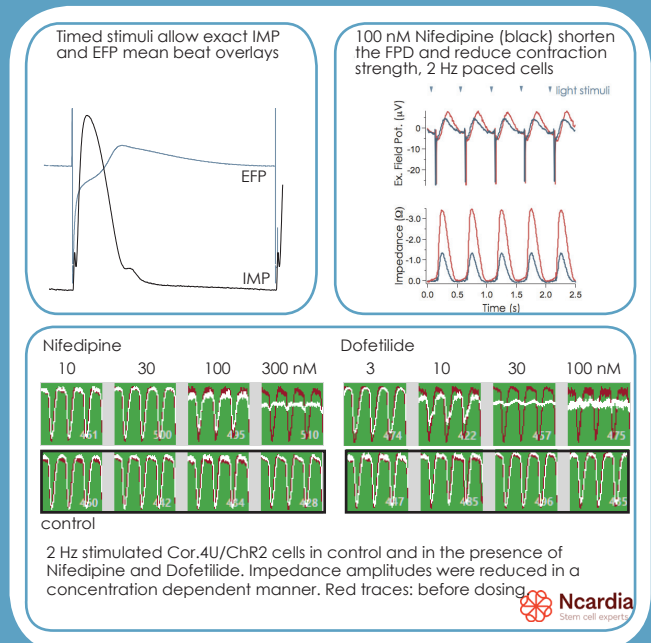
CardioExcyte 96 system with Integra Assist pipetting robot

CardioExcyte96 SOL

Technical details:

- Allows for in vitro optogenetic assays
- Add-on for the CardioExcyte 96 /FLEXcyte 96
- Integrated in the lid of the incubation system
- 96 LEDs - each well is stimulated by an individual LED
- High power LEDs coupled with custom lid optics for robust performance and reliability
- Software controlled adjustment of stimulus intensity, pulse length and pace rate
- Optical wavelength 470 nm, for ChR2, other wave lengths available upon request

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ChR2 transfected Cor.4U cells kindly provided by Ncardia



The CardioExcyte 96 with a Nanion NSP - 96 sensor plate

CardioExcyte 96 SOL software integration

The optical stimulation option is fully integrated in the CardioExcyte Control software. Our data analysis approach enables an exact alignment of both impedance and EFP traces with the light stimuli. Optical stimulation can be switched on or off individually for a subset of wells. Furthermore, cells can be either continuously stimulated or specifically timed, depending on the experiment. A setup that provides high flexibility!

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