>> Functional Analysis of iPSC-derived Three-Dimensional Models on Traditional and Novel Microelectrode Arrays

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Live Cell Analysis

The Maestro MEA Product Family

Features	*Maestro Pro*	*Maestro Edge*	*Maestro Volt**
Throughput (well format)	6, 24, 48, 96, 384**	6, 24, 96**	6
MEA Mode	✓	✓	✓
MEA Viability	✓	✓	
Impedance Mode	✓	✓	
Environmental Control	✓	✓	✓
Automation API	✓	✓	
Stimulation	Electrical & Optical	Electrical & Optical	Electrical
Omni Compatible	✓	✓	✓

*Maestro Volt only available in Europe and Asia
**Well format available in impedance only

- ***Label-free, non-invasive tracking*** *extracellular voltage from cultured electro-active cells.*
- ***Integrated environmental control*** *provides a stable benchtop environment for short- and long-term toxicity studies*
- ***Fast data collection rate*** *(12.5 kHz) accurately quantifies the depolarization waveform*
- ***Sensitive voltage resolution*** *detects subtle extracellular action potential events*
- ***Industry-leading array density*** *provides high quality data from across the entire culture*
- ***State-of-the-art electrode processing chip (BioCore v4)*** *offers stronger signals, ultra-low frequency content, and enhanced flexibility*

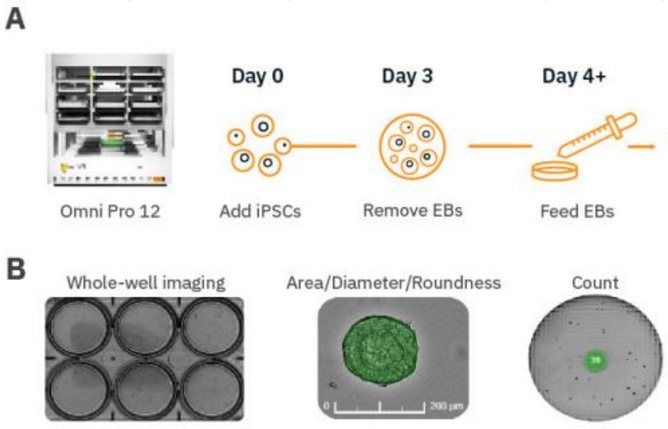
The Omni Product Family

- ***Assay your cells in brightfield and fluorescence –*** *From label-free cell monitoring to fluorescence-based assays, the Omni adds dynamic visual results to any experiment.*
- ***Track every moment, straight from your incubator –*** *The Omni operates within an incubator, automatically capturing images as your cells grow in their optimal environment.*
- ***See every cell –*** *The Omni moves the camera, not the cells, capturing detailed brightfield images of the entire culture without disturbing the cells.*
- ***Monitor and analyze your cells remotely –*** *The software allows you to monitor your cells and perform data analysis from your desktop.*
- ***Get started quickly –*** *With an easy-to-install, maintenance-free device that does not require calibration, a short training is all it takes to start using the Omni.*

Features	*Lux3*	*Omni Pro 12*	*Omni*
Whole-well/Plate Brightfield		✓	✓
Automated Acquisition	✓	✓	✓
Fluorescence	✓	✓	✓
Plate Handling	Manual	Automated	Manual
Number of Plates	1	12	1
Incubator Compatible	✓	✓	✓
Dimensions & Weight	166 x 140 x 135 mm 1,3 kg	460 x 417 x 439 mm 40,2 kg	345 x 396 x 171 mm 9,7 kg

iPSC-Neural Organoid Workflow

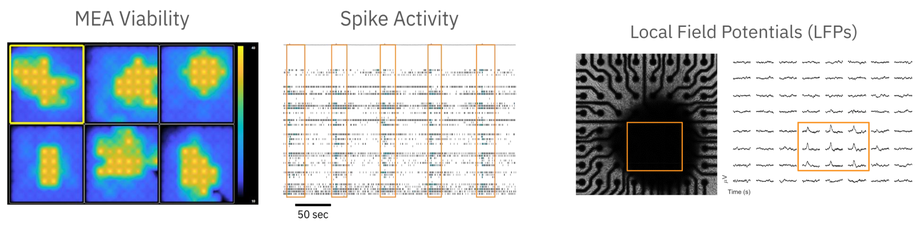
Organoid Analysis Monitors Embryoid Body Number and Size



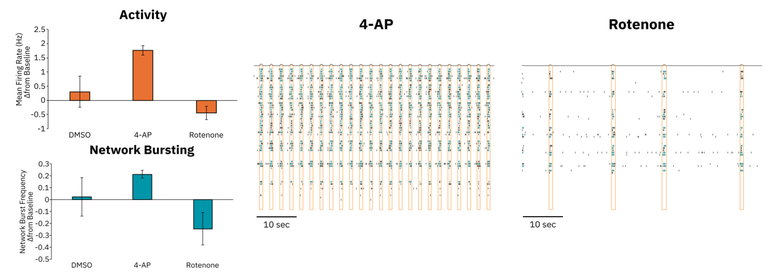
A. EBs were formed via forced centrifugation in Aggrewell™ 800 plates and monitored over several days via the Omni platform.
B. Example whole-well brightfield images of EBs and the metrics provided by the Organoid Analysis module.

Organoid analysis uses whole-well bright field imaging to accurately analyze iPSC-derived embryoid body populations for area, diameter, roundness, and count. In contrast to current methods that rely on manually acquiring images from a standard microscope, the Omni allows for easy, automated characterization of embryoid bodies prior to the initiation of differentiation. By allowing for upstream quality control, the Omni analysis software greatly reduces the time and efforts the user must spend in optimizing long-term differentiation protocols and can provide guidance in identifying key morphological features that are needed for successful differentiation, improving the final yield and reducing overall culture costs.

Real-time Functional Analysis of iPSC-Neural Organoids



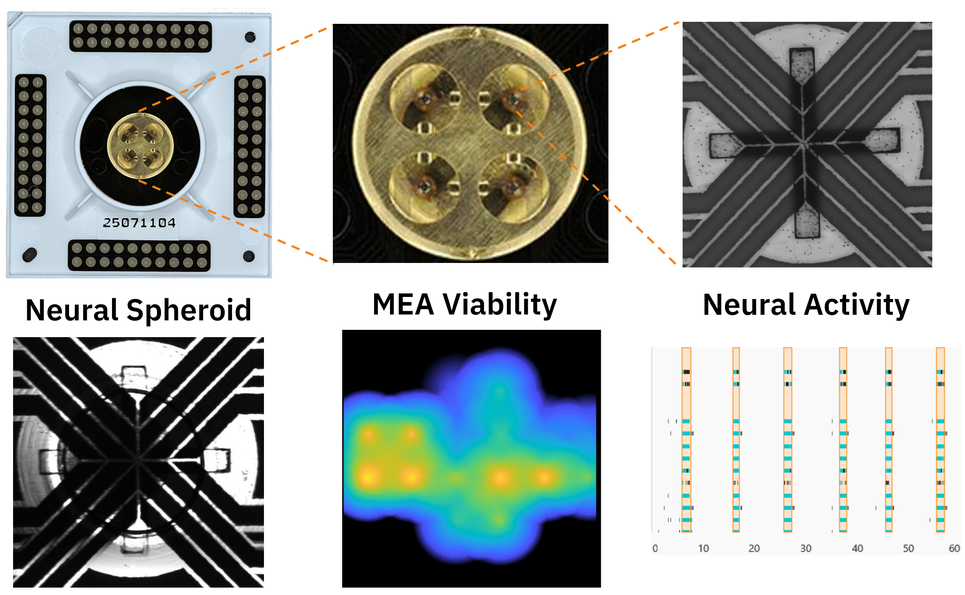
The Maestro MEA platform can be used to characterize the activity of iPSC-derived neural organoids in real-time by measuring important neural metrics such as viability, neural spike activity, and local field potentials (LFP).



We dosed pre-made midbrain organoids (STEMCELL Technologies, Cat. # 200-0793) at 125 days post differentiation with 4-AP and rotenone. 4-AP, a potassium channel blocker, led to an increase in mean firing rate and network burst frequency. In contrast, rotenone, a pesticide that interferes with complex I of the mitochondria, led to marked decreases in mean firing rate and network bursting.

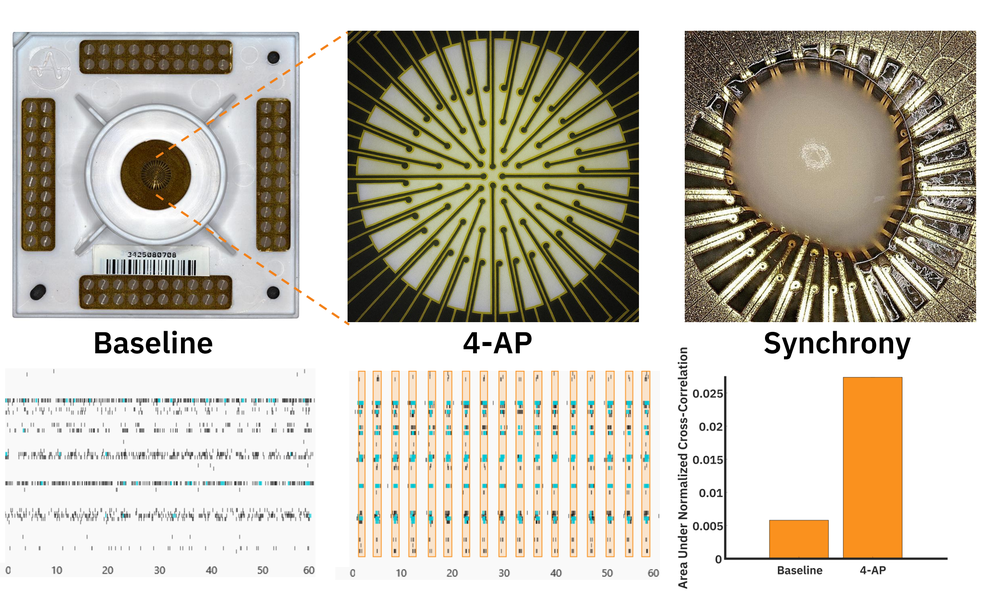
SpheroHD and 3DMap™ MEA – Solutions for Organoids

SpheroHD MEA



The SpheroHD MEA is comprised of an Ibidi 4 Well Fultrac micro-insert adhered to a microelectrode array chip, with each microwell positioned over an array of 16 high-density (50 µm spacing) electrodes. The chip's design leads to improved plating accuracy, ensuring the capture of neural activity on several electrodes even when measuring from small spheroids.

3DMap™ MEA



The 3DMap™ MEA uses flexible cantilevers with 64 electrodes that bend to conform to plated neural organoids, enabling 3D electrophysiological recording. Activity was measured from a pre-made midbrain organoid (STEMCELL Technologies, Cat. # 200-0793) at 111 days post differentiation. The organoid was also dosed with 4-AP, which led to marked increases in network bursting and synchrony.