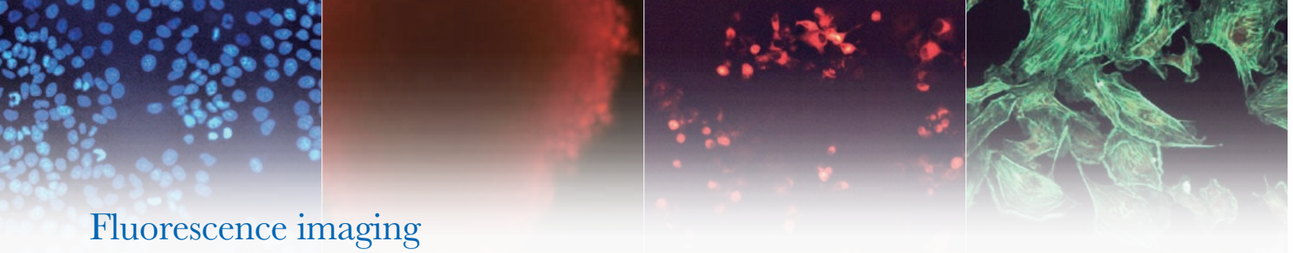
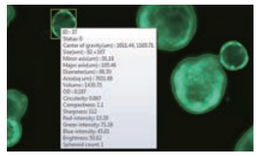
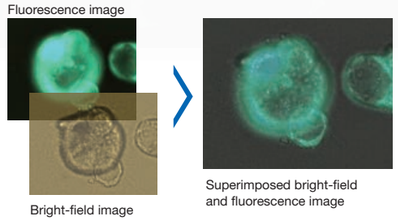


Fluorescence imaging

Cell³iMager duos has fluorescence imaging capability. It comes with 5 fluorescence channels and is compatible with a variety of dyes to meet a wide range of image based screening applications. Duos powerful software can accurately merge fluorescence images with bright-field images. Under fluorescence mode cells can be identified and quantified based on morphology as well as fluorescence intensity. Duos color camera can acquire multi-fluorescence images at a time and quantify the intensity of each colors efficiently (e. g. combination of GFP and PI). It can be used as a valuable tool in several drug discovery and development applications.



Fluorescence intensity and other quantitative information for each spheroid / organoid can be checked by simply clicking on the image. This is an image of colon cancer organoids



Product Specifications

Image mode	Bright-filed, Fluorescence
Bright field light source	White LED
Fluorescent light source	U 384nm, B 470nm, G 530nm, Y 565nm, R 625nm
Optical system	Hyper-centric optical system (High-speed mode) Telecentric optical system (High-resolution mode)
Camera	CMOS 4.2 megapixcel
Stage	Imaging is carried out with a non-moving culture plate
Focus	Real-time autofocus with laser Image contrast software autofocus
Measure	Single cell count, colony segmentation, live-dead cell number, spheroid area, circularity, diameter, and optical density
PC	Windows 8.1 Xeon workstation
Resolutions	4.0 µm (High-speed mode) 0.8 µm (High resolution mode)
Well plate	6, 12, 24, 48, 96, 384-well plate 35, 60mm dish
Image output	Raw image 24-bit color Tiff, 8-bit gray Tiff
Power requirements	AC100-240V
Dimentions	W677 x D570 x H550 (mm)
Weight	106 kg

*For life science research only. Not for use in diagnostic procedures.

Fluorescent light source

Excitation light	Wavelength(nm)	Sompole of Fluorogenic reagent
Ultra-violet	385	Hoechst, DAPI
Blue	470	EGFP, FITC, AlexaFluor 488
Green	530	DsRed, Cy3, PI
Yellow	565	Texas Red, AlexaFluor 568, AlexaFluor 594
Red	625	Cy5, AlexaFluor 647, AlexaFluor 660

*Red is under development.

Space requirements

Dimensions in 'mm'

The data shown here is as of August, 2017. Specifications and design of the unit are subject to change for improvement.

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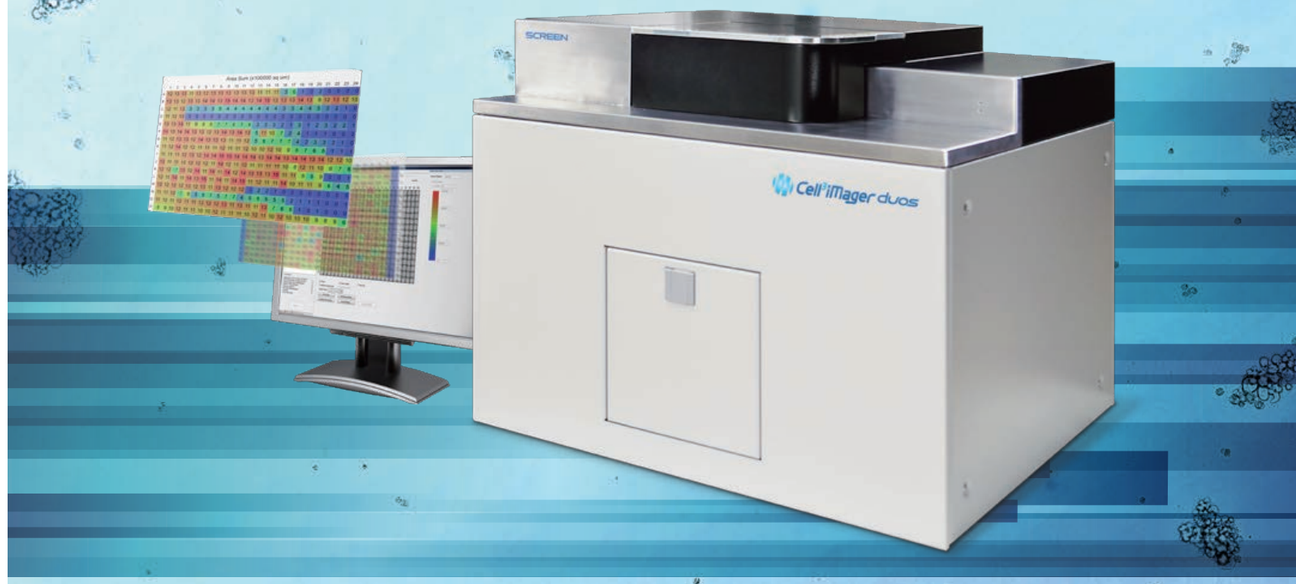
SCREEN

Fluorescence Imaging available

A high-throughput, high-resolution imager for label-free profiling of 2D and 3D cell culture

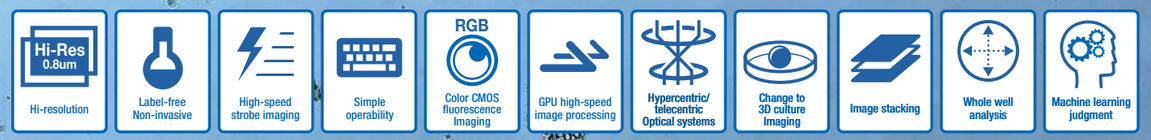
Cell³iMager duos



Cell³iMager duos is a bench-top imager capable of high-throughput, whole-well imaging at high-resolutions, and provides both bright-field and fluorescence imaging options. It can be used as a valuable tool in several drug discovery and development applications as well as toxicology testing to select therapeutic targets and treatment strategies before costly and tedious testing in animal models.

Key applications

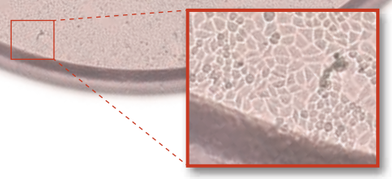
- 2D & 3D cellular imaging and analysis
- Cell proliferation and cytotoxicity assays
- Drug-target discovery and validation
- Combinatorial drug testing
- Antibody development
- Quality control of adherent and suspension cell culture
- Regenerative medicine



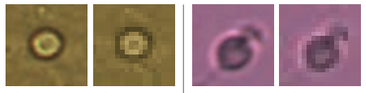
Cell³iMager was designed to overcome the throughput and speed limitations of existing automated microscopes and high-content imaging systems. This bench-top imager helps researchers to analyze both suspension and adherent cells by fast and parallel scanning under bright-field and fluorescence modes.

Excellent optics for uncompromised bright-field imaging

Cell³iMager duos facilitate uniform, whole-well imaging of each and every cell in a well, including well periphery, at high-resolutions. Duos proprietary lens captures images at two different resolutions; 0.8µm & 4.0µm, thus enable qualitative and quantitative measurement of single cells and colonies grown in 2D culture as well as growth and morphological changes of spheroids/organoids grown in 3D culture. Duos automatic cell morphological classification (ACMC) feature allow 'intelligent' automatic classification of live and dead spheroids/cells, using logic derived from a user-defined reference set of respective objects. Hence, duos could be used in several complex drug discovery and development studies.

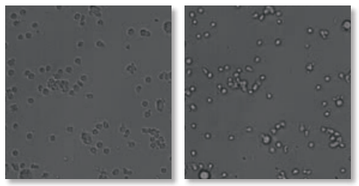


Comparison of single-cell images captured by duos and other imagers



High-speed scanning for whole well

Duos unique LED-strobe light based optical system along with its 4.2 megapixel area sensor ensures nonstop imaging continuously and automatically. At high-speed mode duos rapidly images nearly all types of microplates without any plate movement, ensuring no sample agitation or image blurring even for the suspension cells. As for the focus setting, duos focus adjustment mechanism can maintain the focus and automatically adjust it to suit the type and thickness of the sample being worked, thus help researchers meet their requirements.

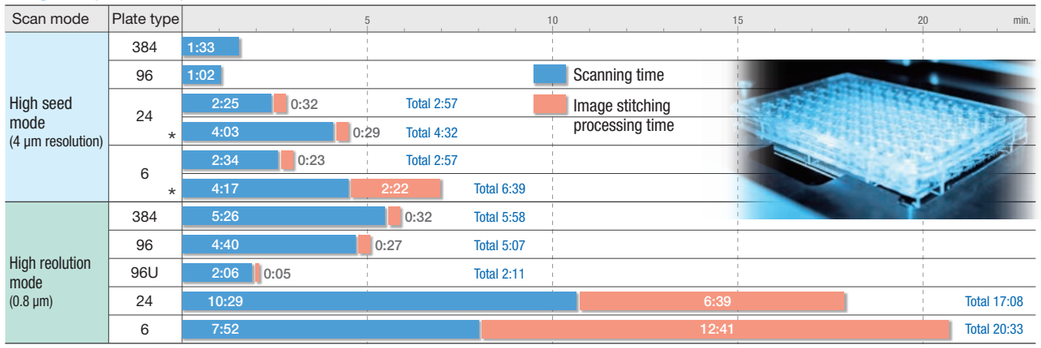


Real-time autofocus with laser

As the machine always scan with best focuses, the high quality images can be met with researches expectation and every cells in a well can be counted accurately.

Image acquisition speed

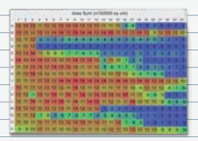
* Pixel Thinning Mode with 0.8 µm Resolution lens



Examples of applications

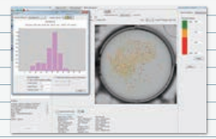
Label-free drug efficacy testing

The whole-well imaging under bright-field mode enable monitoring and quantifying cell proliferation (both adherent and suspension cells) upon drug treatment continuously and non-invasively.



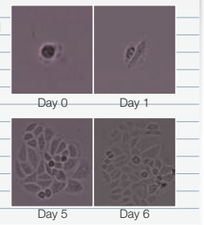
Quality control tool

Size is a critical parameter when trying to recreate normal, healthy tissues in vitro. Duos helps to scan and measure spheres / spheroids / organoids quickly while growing them and ensure that they meet with the stringent size and functionality specifications. Also, its obvious that the benefits of being able to quickly measure spheroids naturally extend to the concept of phenotypic screening as a means of monitoring spheroid size and morphological changes in growing tumor spheroids, and using size as an endpoint when screening drug efficacy in tumor spheroids.



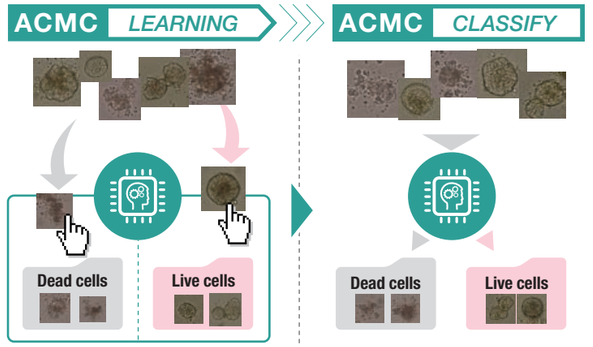
Cell proliferation assays

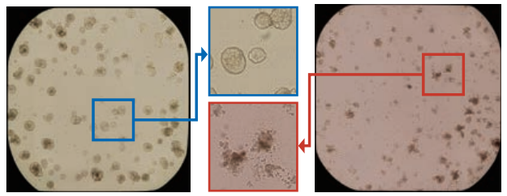
Duos capture single-cells even at the well peripheral area, without the influence of shadow caused by meniscus. This can be applied to monitor colony segmentation from single-cell efficiently.



Intelligent Automatic Cell Morphological Classification (ACMC) feature

It's difficult to judge viable and dead cells accurately by simple measurement and analysis settings in all cases. Cell³iMager duos is equipped with ACMC to ensure highly accurate classification of spheroids/organoids in bright-field. Such classification is executed by "dozens of (about 110) feature quantities extracted from a user-defined reference set of high-definition live/dead spheroid images in the learning process.





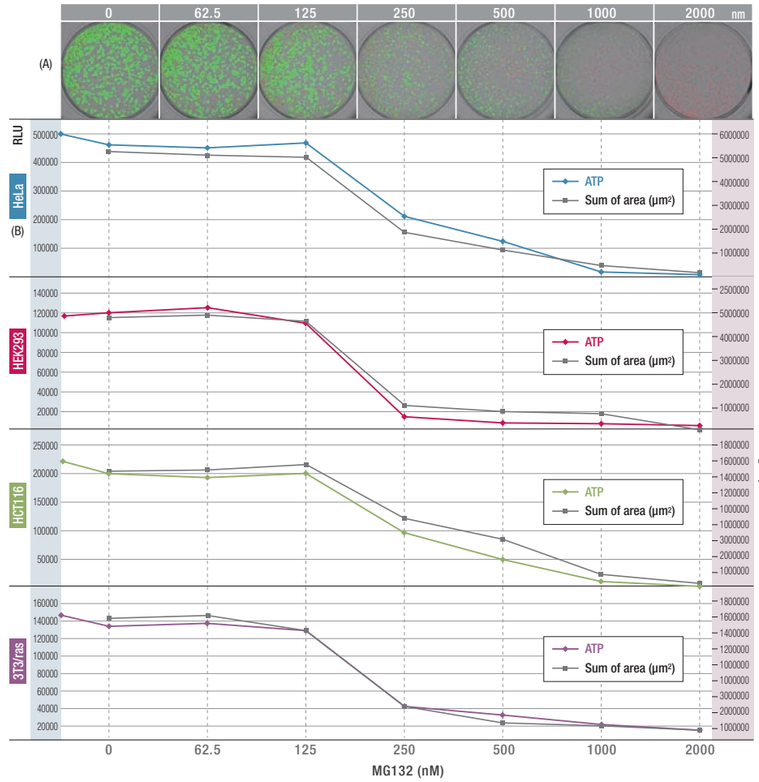
Live (left) and dead (right) clusters of colorectal tumor organoids. ACMC function provides label-free determination of cell/organoid viability by analyzing their feature values such as size, color and shape. It also calculates the texture of organoids which otherwise is difficult to measure.

Size profiling by duos vs biochemical readout

Spheroid size, morphology, counts etc. are relevant endpoints for various applications. In order to confirm that size measurement with the duos could be a relevant end point in phenotypic screening we measured the ATP content of different spheroids generated using different cell lines and compared them with the number of spheroids counted by duos. As expected, ATP content of spheroids decreased with increasing compound concentrations for the compound tested.

This study thus proves that the measurement of size with the Cell³iMager duos could be a suitable endpoint compared to that of ATP content for drug induced cytotoxicity in tumor spheroids, without lysing cells or otherwise interfering with long-term culture of spheroids.

(A) Colonies captured and quantified by duos. Live cells are marked in green and dead cells in red
(B) Drug sensitivity of different types of spheroids to MG132, a proteasome inhibitor, was tested in a time-course study, with area of colony and their size assessed daily for 1week using the Cell³iMager duos. MG132 inhibited growth at concentrations of 250 nM and higher. Comparison of day7 colonies area to total ATP levels using ATP Cell Viability Assay at day 7 following treatment



Z-stacking of 3D cellular structures

Duos provide a unique focus bracketing option (similar to 'Z' stacking) which enables high quality analysis of spheroids in hanging droplet assays or embedded in hydrogel systems, which otherwise can't be adequately captured.
Focus bracketing acquires images over multiple focal planes/slices to obtain a multilayered image. With duos, up to 50 slices can be captured to acquire all important details of the spheroids or organoids. Duos composite function offer great flexibility to combine/quantify mass of cells spread in the 'Z'-direction into a single information loaded image.