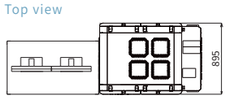
Specifications

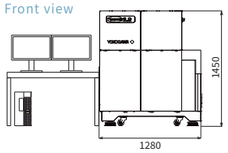
Model	CV8000
Sample format	Multiple well plate (6, 12, 24, 48, 96, 384, 1536 wells), Glass slide
Image mode	Confocal mode: Max. 4 color simultaneous recording Bright field / Phase contrast (10x, 20x for 6, 12, 24 well plates), Digital phase contrast (10x, 20x)
Output data format	Image data: 16bit TIFF, PNG Numerical data: CSV, original format
Excitation wavelength	405/445/488/561/640 nm, all solid laser, max. 5 lasers 【Option】365 nm LED
White light illumination	LED
Autofocus	Laser-based mode, image-based mode
Objectives	Max. 6 lenses are available, automatically switchable Dry: 2x, 4x, 10x, 20x, 40x Water immersion: 20x, 40x, 60x Phase contrast: 10x, 20x Long working distance: 20x
Confocal unit	Microlens-enhanced wide-view dual Nipkow disk confocal scanner, 50 µm pinhole 【Option】25 µm pinhole disk and auto pinhole disk exchanger
Camera	sCMOS (Effective pixels: 2,000 X 2,000 pixel size: 6.5 µm) Max. 4 cameras
Stage incubator	Temperature for inchbation : 35 - 40°C CO_2 supply box (CO_2: 5 %, forced humidification)
Robot pipetter	【Option】Disposable tip type (96 tip or 384 tip type)
Bar code reader	【Option】1 or 2 dimension
Workstations	Dual-monitor work station for system control, dual-monitor work station for data analysis
Analysis software (CellPathfinder)	Granularity, Neurite, Nuclear morphology, Nuclear translocation, Plasma membrane translocation, Machine learning, Label-free analysis, 3D analysis, Deep Learning, etc.
Operating environment	15 - 30°C 30 - 70%RH (No condensation)
Power supply	Measurement unit: AC100-240V, 50/60Hz, 2KVA max Workstation for system control: AC100-240V, 50/60Hz, 1.3KVA max Workstation for data analysis: AC100-240V, 50/60Hz, 950VA max
Dimensions	Measurement unit: W1,280×D895×H1,450 mm
Weight	Measurement unit: 510Kg

Layout

■ Top view



■ Front view



(Unit:mm) ※Exclude protruding parts.
Workstation for data analysis is not indicated above.
Desk is not included in the system.

Reliable after-service / Powerful technical support

We offer the best after-service program to meet your requirement and budget.
Our HCA experts will support you to obtain the best results easily.

CLASS 1 LASER PRODUCT
クラス1レーザ製品
1类激光产品
PRODUIT LASER DE CLASSE 1.
(EN 60825-1:2014+A11:2021)
(IEC 60825-1:2007)
(JIS C 6802:2014) (GB 7247.1-2012)

Complies with 21 CFR 1040.10 and 1040.11 expect for deviations pursuant to Laser Notice No.50, dated June 24, 2007
Yokogawa Electric Corporation
2-9-32 Nakacho, Musashino-shi, Tokyo, 180-8750 Japan Manufactured KZ

Caution
- Read user's manual carefully in order to use the instrument correctly and safely.
- This product falls under the category of class 1aser product.

**Information is distributed on a regular basis.
Please follow for the latest information.**

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YOKOGAWA

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Represented by

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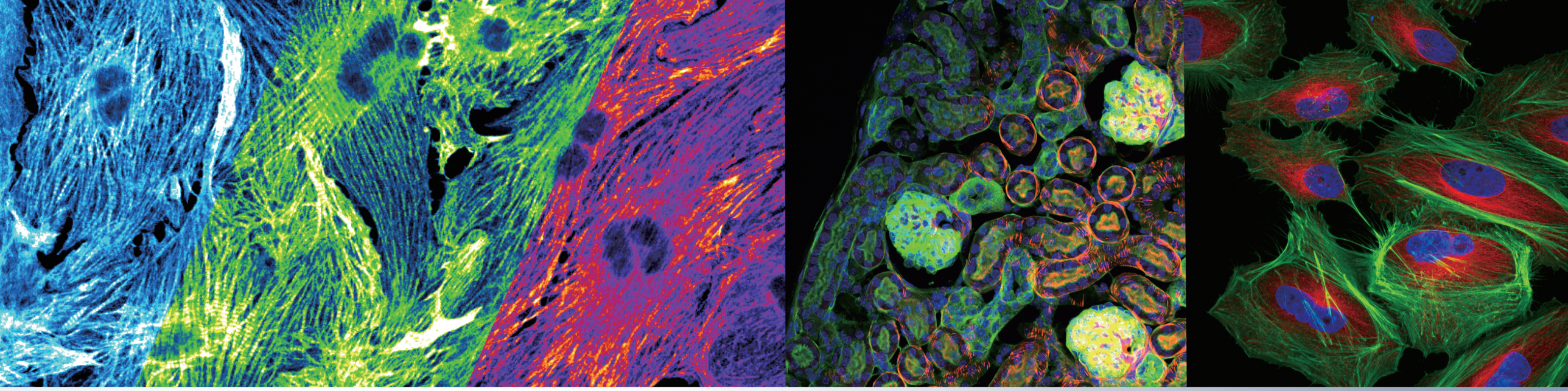
High-throughput Cytological Discovery System

CellVoyager CV8000

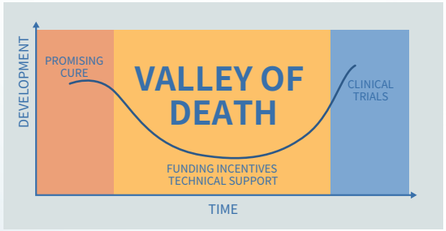
Bulletin 80H01D01-01E



Summary

Introduction

Within the drug development market, demands on high content analysis systems for drug efficacy evaluation are increasing in accordance with the needs for cell-based assay and phenotypic screening. In order to increase screening efficiency, devices with higher speeds (higher throughput) are required.
On the other hand, in order to bridge the “valley of death” of the drug development process, the quality of screening hits must be increased. This requires the construction of more complex evaluation systems that utilize multifaceted parameters via 3D cultivation systems, live-cell imaging and higher detail image analysis.
In current drug development research, determining how to implement throughput screening and complex evaluation system screening in parallel is an important issue.



Solution

The CellVoyager CV8000 is a high-end, high content analysis system that solves this contradictory screening challenge.
Through the combination of a proprietary Yokogawa high speed confocal scanner, water immersion lens, up to four high field-of-vision cameras, a microscopic stage with cell cultivation environment, and an integrated robotic pipetter, we have realized not only high throughput, high-resolution imaging, but also phenotypic screening via a more complex evaluation system.
In addition, our specialized analysis software, CellPathfinder, uses deep leaning and machine learning to recognize target objects with high accuracy, supporting you from image analysis to results display using graphs.

CellVoyager CV8000

The Yokogawa advantage

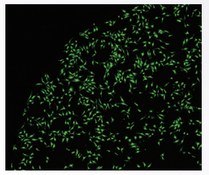
- Confocal scaner unit
- Live/kinetic experiment compatible
- High throughput
- Reliable, proven technology

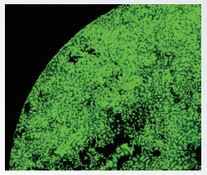
Voyage to unknown worlds

-Real time confocal and label-free imaging-

Long-term live cell imaging

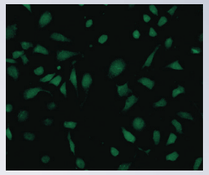
Stage incubator included as standard.
Realization of non-stop, long-duration observation (3 days +) via humidity, temperature and CO2 control.

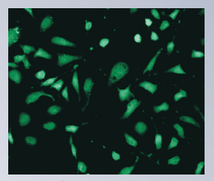

Before incubation


After 68 hours incubation

Kinetic assay

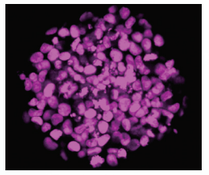
Drug addition during imaging is made possible by an integrated robotic pipetter with disposable tips
Ideal for kinetic experiments involving the observation of high speed phenomena.


Before instillation


After instillation

Organoid / Spheroid

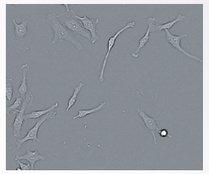
Yokogawa’ s spinning disk confocal technology excels in imaging of samples with depth, such as 3D culture samples where clear and quick imaging is difficult, allowing for evaluation close to in-vivo quality.

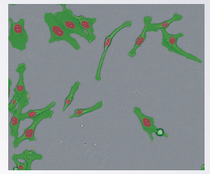

Original image


Recognition image

Label-free analysis

Recognition and analysis can be performed by taking bright field images from several Z positions and creating a CE bright field image using the included CellPathfinder analysis software. Analysis accuracy is further enhanced via the new Deep Learning option.


CE Bright Field


Cell Recognition image

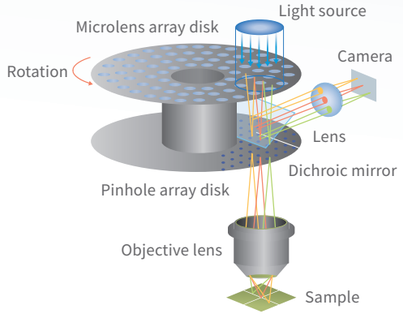
State-of-the-art technology that enables you to do what you want

Cell Voyager CV8000

Observe cells as they are

Dual spinning disk confocal system

A Yokogawa proprietary multi-scan method utilizing approximately 1,000 laser beams on the observation region and tandem disks rotating at high speed. The disks comprise a pinhole array disk with approximately 20,000 pinholes arranged in an equal pitch spiral pattern, and a microlens array disk that focuses the excitation light laser into individual pinholes. Not only does this allow high speed imaging, but it also largely prevents phototoxicity and fluorescence photobleaching.

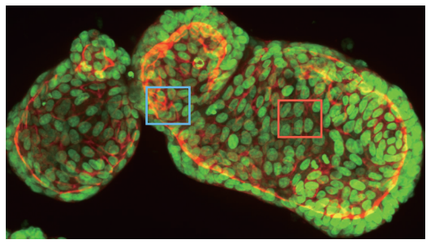


Deeper, clearer observation

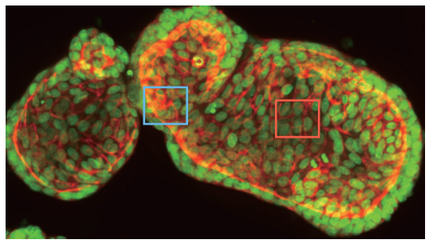
Pinhole disk exchanger

Two different types of pinhole disks (25/50µm) can be used, according to the sample. For thick samples, reducing the pinhole diameter allows for higher confocality, shaper images. For dark samples, increasing the pinhole diameter allows for brighter images.

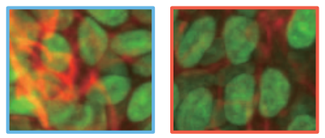
● Organoid imaging example (MIP)



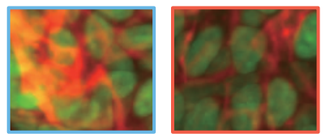
25µm pinhole



50µm pinhole



Enlarged image

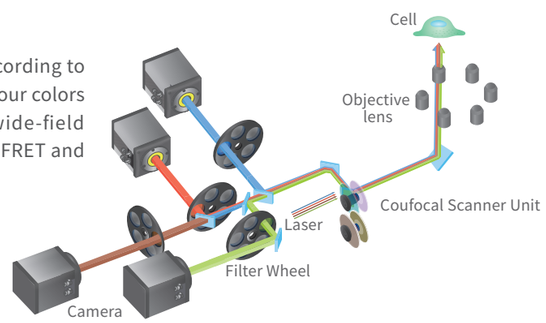


Enlarged image

Higher throughput screening

Optical configuration

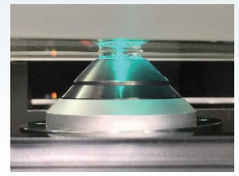
The optical system configuration can be selected according to the purpose. A single 96-well plate can be imaged in four colors in one minute by attaching four high-sensitivity wide-field sCMOS cameras. The system is also compatible with FRET and CellPainting assay.



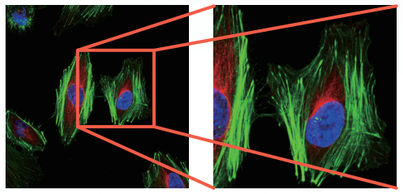
Capturing finer structures

Original water immersion lens

Water immersion lenses excel in capturing high-resolution images of cells within a liquid. The CV8000 can be equipped with a 20x, 40x or 60x water immersion objective lens. Our 20x and 40x lens are a particularly unique lens capable of highly advanced spherical aberration correction, allowing for the capture of bright high-resolution images over a full wide-field. The lens water supply is also completely automated. This equipment makes high throughput screening via water submersion lens possible.



● Cell image captured using the 60x water submersion lens

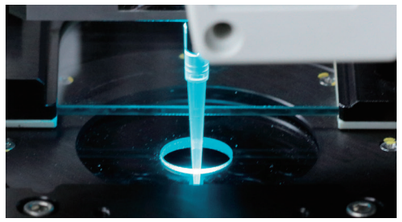


Original image　　Enlarged image

Capturing live cell movement

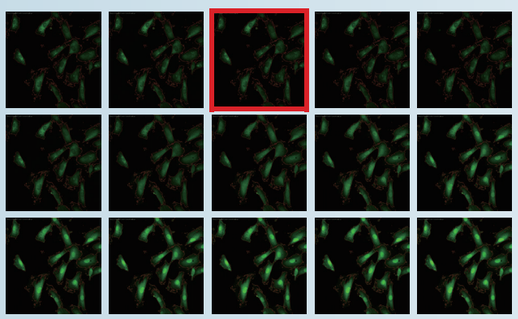
High-precision incubator and robot pipetter

The stage incubator features an airtight construction, managing humidity, temperature and CO_2 levels. The integrated robotic pipetter conducts the following process fully automatically: tip pickup → reagent collection from the reagent plate → reagent addition to the sample plate → tip disposal. Not only can images be rapidly obtained before and after reagent instillation, but it's also possible to add reagents to single wells multiple times, and adjust the addition speed etc., broadening the range of dynamics observation via reagent instillation.

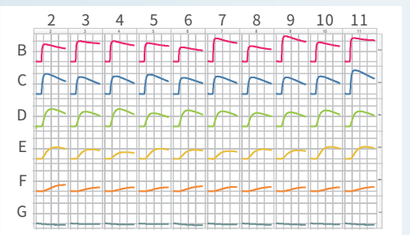


Ionomycin concentration-dependant calcium response

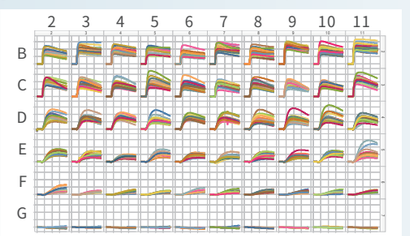
It's possible to conduct high speed imaging before and after ionomycin instillation, recognize individual cells from the images, and obtain timelapse data for each cell.



0.2 second interval images (2.6 seconds after imaging start to 5.4 seconds after)
Ionomycin instillation conducted at 3.0 seconds after imaging start (red frame)



Average of individual cell fluorescence intensity (mean) for each well



Fluorescence intensity (mean) for individual cells in each well

A more live-cell-friendly total HCA system

Making long-duration live-cell imaging possible

Featuring a stable built-in stage incubator

HeLa cells were seeded in a 96 well plate at a density of 500 cells per well, and cultured for 24 hours. The well plate was then placed in the internal stage incubator and cell culturing was conducted for 72 hours, and the total area (hereinafter Total Area) occupied by cells was analyzed. As a result, minimal unevenness in cell multiplication was observed across the 96-wells (excluding the four corner wells) when compared to a regular CO_2 incubator.

Scan for information

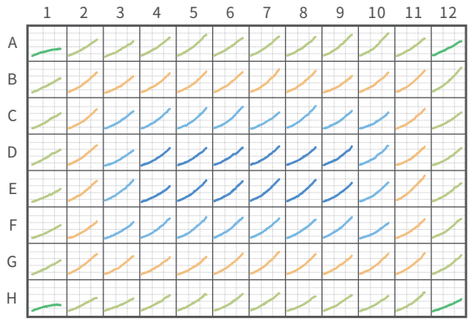
Cell multiplication comparison with regular CO_2 incubator after 72hr incubation (n=3)

	1	2	3	4	5	6	7	8	9	10	11	12
A	47	77	79	79	90	86	83	84	80	76	74	64
B	73	87	83	84	88	95	91	94	93	97	89	80
C	86	89	89	94	95	93	100	99	99	92	102	85
D	84	96	93	98	94	95	90	98	93	105	112	87
E	93	97	98	95	92	98	95	103	94	98	103	88
F	94	95	93	96	93	92	98	96	101	102	106	80
G	87	92	99	92	92	93	95	100	98	109	96	84
H	51	77	83	80	87	84	90	87	91	91	101	64

96 well average: 90
Average of outermost 36 wells: 81
Average of 60 wells (excl. outermost): 96

The values represent the following: CV8000 Total Area after 72hrs / Total Area at 0hrs (hereinafter Total Area ratio) / CO_2 incubator Total Area ratio x 100.
(Numbers near to 100 mean that cell multiplication was approximately equal for the CV8000 and CO_2 incubator.)
Cell multiplication near to that of the CO_2 incubator was verified, excluding the four corner wells.

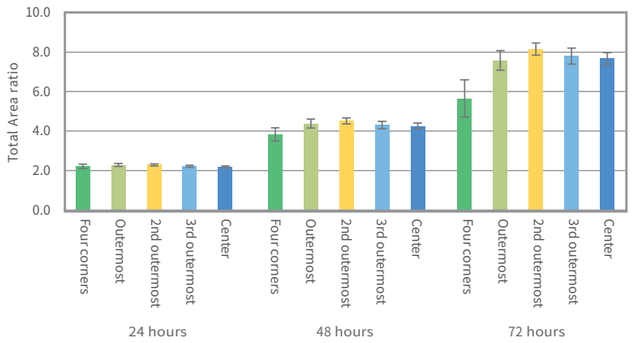
Cell multiplication curves for each well of a 96-well plate

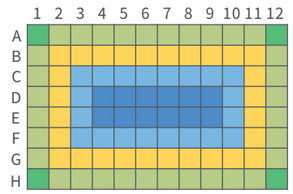


Vertical axis: Total Area
Horizontal axis: Time (0-72 hours)

Cell multiplication was low in the four corner wells; however, it continued in the other wells.

Total Area ratio after cultivation start (24, 48 and 72 hours) (n=3)

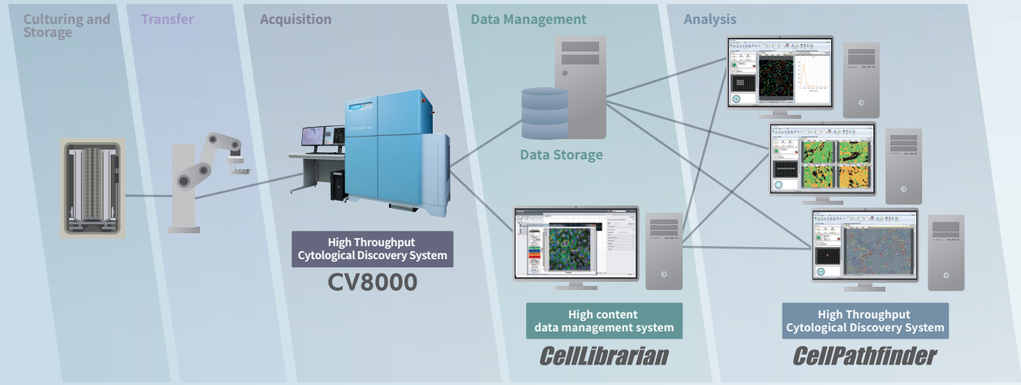




Excluding the four corner wells, even after 72 hours, there were no large differences in cell multiplication. The low variation in cell multiplication speed across the wells can be seen.

System Integration

Centralized process management, from the cultivation environment, to transfer, imaging, analysis and data management.
We offer optimum systems in response to our customers' needs.



High Content Analysis Software CellPathfinder

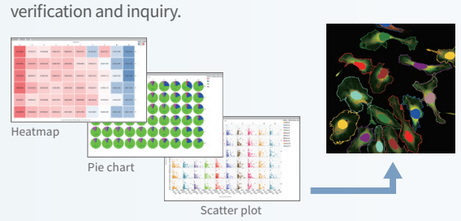
The software analyzes image data captured with the CV8000, creates graphs and exports various data. Beginner and expert users alike can take full advantage of the software, thanks to an abundance of templates and flexible protocol editing capability. CE bright field and machine-learning functionalities make label-free analysis possible. The new Deep Learning option has also been added, largely improving cell recognition accuracy.

Just click the menu item for analysis

Simply follow the flow displayed at the top of the screen.
The analysis menu has easy-to-understand icons.
Simply click the desired menu item and the protocol will load.

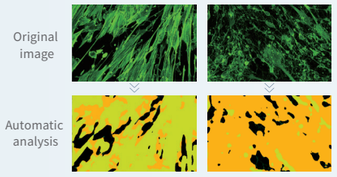
Fast results for immediate verification and study

Computed numeric data can be displayed in a variety of ways.
Graph plots and cell images are linked, making for easy result verification and inquiry.



Unbiased phenotype evaluation via AI

Machine-learning also provides bias-free digitization of visually-evaluated experiments
Automatic recognition is made possible simply by clicking the shape you want the software to learn



Label-free phenotype analysis

Eliminates the time, cost and influence on cells associated with cell labelling
Even higher precision classification is made possible through combination with deep learning