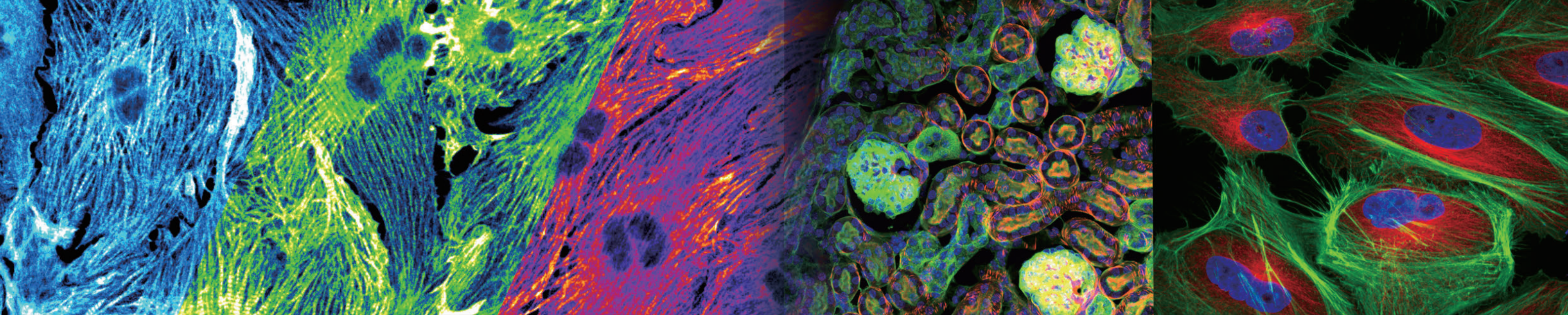




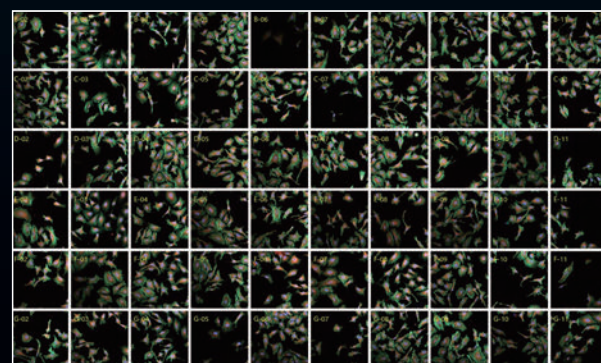
High-throughput Cytological Discovery System **CV8000**



Voyage to spectacular cell worlds!

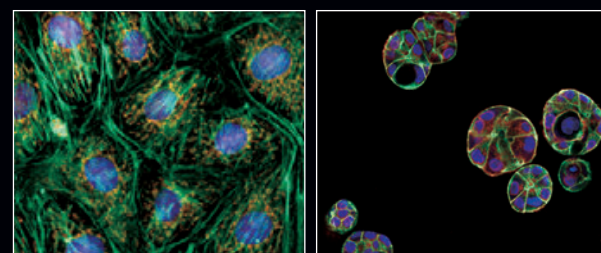
High Speed

Drug discovery assays, which require a substantial amount of time and effort, are a major challenge in the drug discovery process. Yokogawa's high-speed stage and spinning disk confocal technology achieve unparalleled imaging speed, greatly reducing the time required for such assays. We desire to give researchers time to focus on their more advanced work. This desire is integrated into the high-speed technology of the CV8000.



High Resolution

Closer to live organisms. Finer structures. Yokogawa has been working on the increasing trend of 3D tissue imaging, and continues to take on the challenge of achieving higher image quality. From 2D to 3D, and now to 4D with time-lapse imaging. Yokogawa's spinning disk confocal technology, which enables brighter imaging of samples, also produces more detailed and brighter images in 3D and 4D.



Cell Voyager CV8000
High-throughput Cytological Discovery System

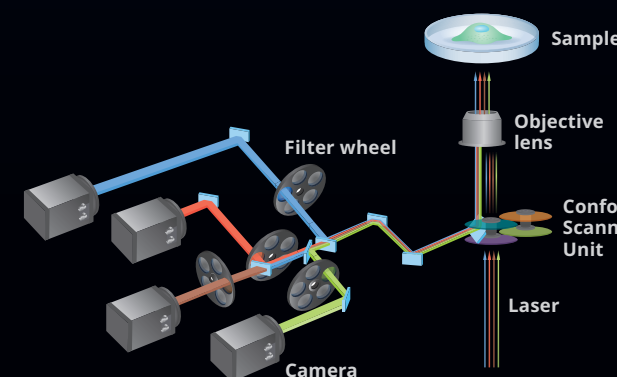


 Voyage to unknown worlds — Real time confocal and label-free imaging

Screening with higher throughput

Optical configuration

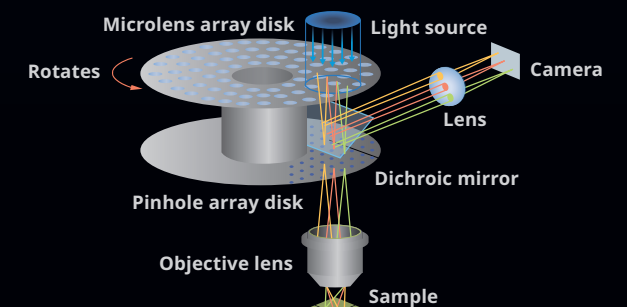
The optical system configuration can be selected according to the application. Installing four high-sensitivity, widefield sCMOS cameras enables four-color imaging for a single 96-well plate in about one minute. The system can also be used for FRET and Cell Painting assays.



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 area and tandem disks rotating at high speed. One disk is a pinhole array disk with approximately 20,000 pinholes arranged in a spiral pattern with equal pitch, and the other is a microlens array disk that focuses the excitation laser beams into each pinhole. Not only does this enable high-speed imaging, but also significantly reduces phototoxicity and fluorescence photobleaching.



Supporting users' assays and helping them observe with more accuracy

Fast and reliable control devices

High-level control technology is required for high-speed and high-reproducibility imaging. Yokogawa possesses advanced control technology that has been refined over more than 100 years. The CV8000 is equipped with this high-precision control controller to enable high-speed and stable control.



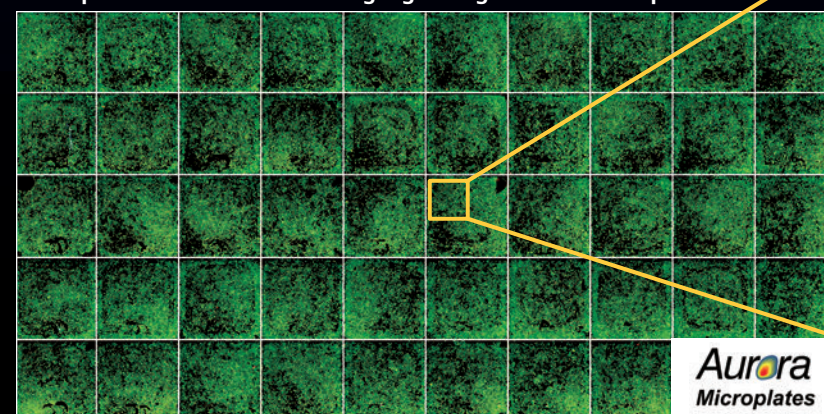
Industry-leading speed and image quality



High-speed screening with up to 4-camera, 4-color simultaneous imaging

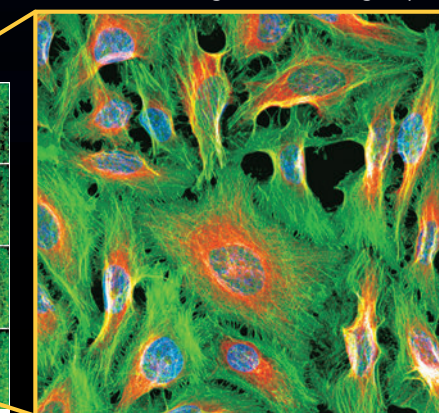
The CV8000 is equipped with YOKOGAWA's unique high-speed confocal scanner, four wide-field high-sensitivity cameras, and a microscope stage capable of maintaining a cell culture environment, enabling high-throughput, high-definition imaging.

Example of cultured cell imaging using a multi-well plate



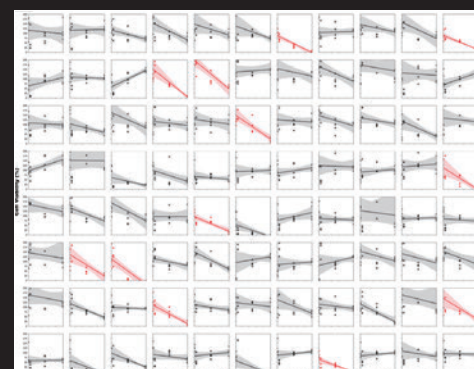
Aurora
Microplates

Provides clear images even at high speeds



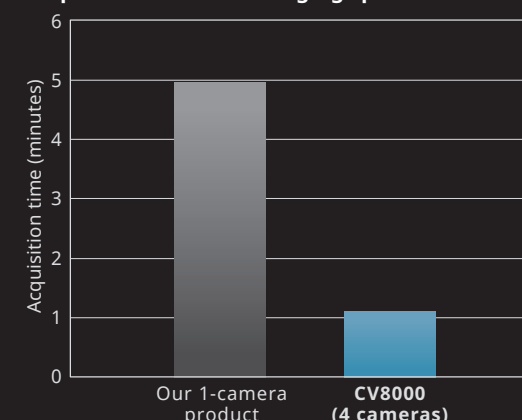
Courtesy of Zeon Corporation

Example of analysis of drug concentration-dependent effects on cell viability



Courtesy of the University of Michigan Medical School

Comparison of 4-color imaging speed of 96-well plate

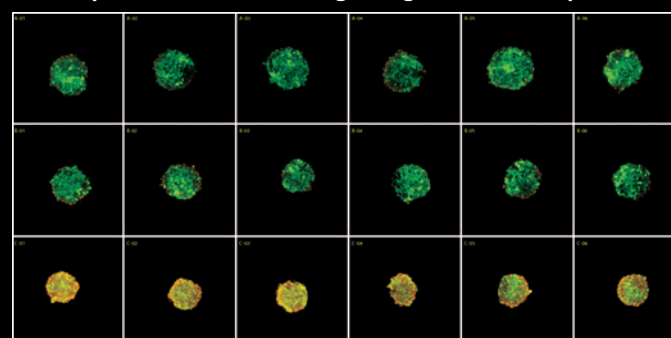


Fast and beautiful observation of 3D tissue via high-speed confocal mechanism

CV8000's fast 3D imaging combined with its projection function allows for efficient imaging and analysis even of 3D samples. Furthermore, applying the system to live cells opens the door to the establishment of new experimental systems such as time-series analysis.

Green: Cytoplasm
Orange: Mitochondria

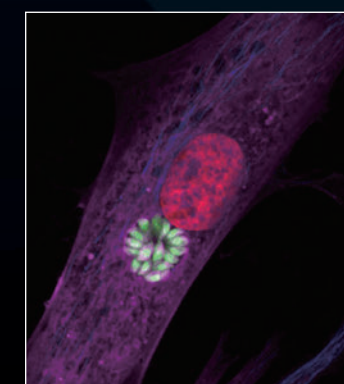
Example of 3D cell screening using HEK293 cell spheroids



New discoveries with high-resolution multicolor imaging

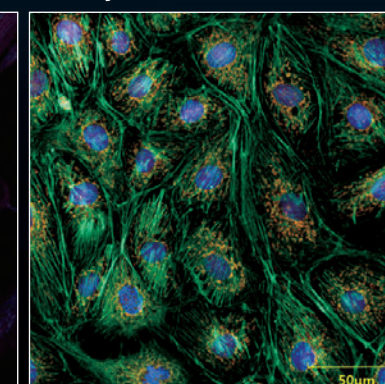
With up to four widefield sCMOS cameras, the CV8000 can acquire images of multiple-stained samples over a wide area in a single shot. In addition to the standard 50- μ m confocal pinhole Nipkow disk, the CV8000 can be equipped with an optional 25- μ m Nipkow disk for improved confocal performance at lower magnifications, enabling measurement of a wide range of samples.

Fibroblast



Courtesy of the University of Michigan Medical School

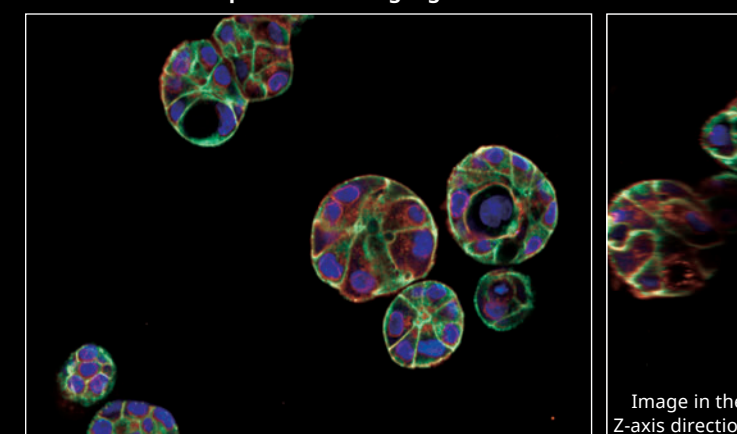
Bovine pulmonary artery endothelial cells (BPAEC)



Biological evaluation of 3D tissue with clear images

The CV8000's high-speed imaging demonstrates its true value in the imaging of 3D cell masses and tissues. The ability to acquire images while minimizing photobleaching allows for deep observation of thick tissues and accurate analysis of biological phenomena.

Example of 3D imaging a 3D cell mass



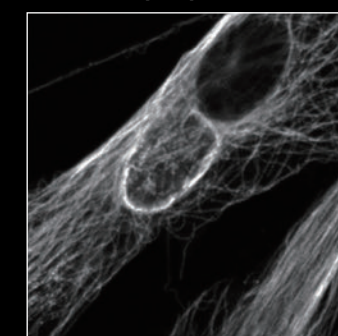
Courtesy of Baylor College of Medicine

Images with higher resolution

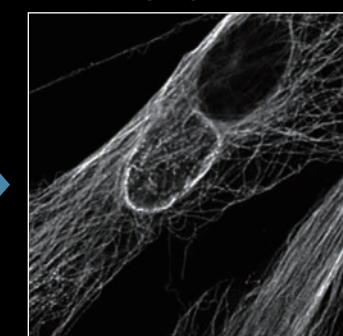
Pinhole disk switching

By switching the pinhole size based on the magnification of the objective lens, high-resolution imaging is possible even at low magnifications.

50- μ m pinhole



25- μ m pinhole



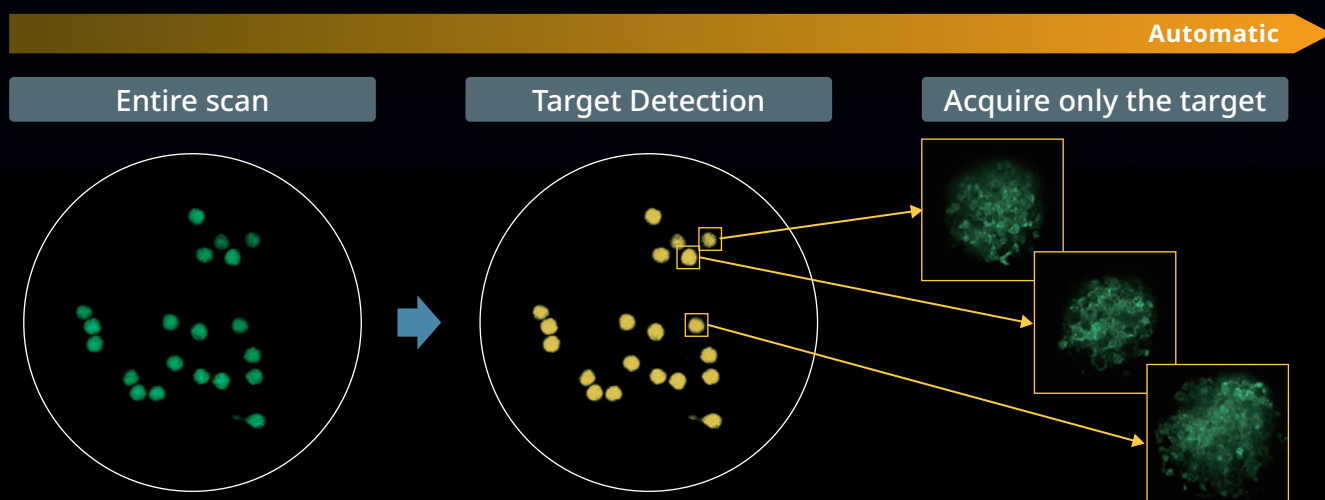
Courtesy of the University of Michigan Medical School



NEW

Target Search function

Automatically detects and acquires only the desired object!



- Locates and selectively captures objects such as spheroids whose locations are unknown in the well or cells labeled with a specific marker using image analysis
- Objective lens also switches automatically
- Significantly reduces the time and effort required to acquire images
- Significantly reduces data volume because unnecessary fields of view are not captured.

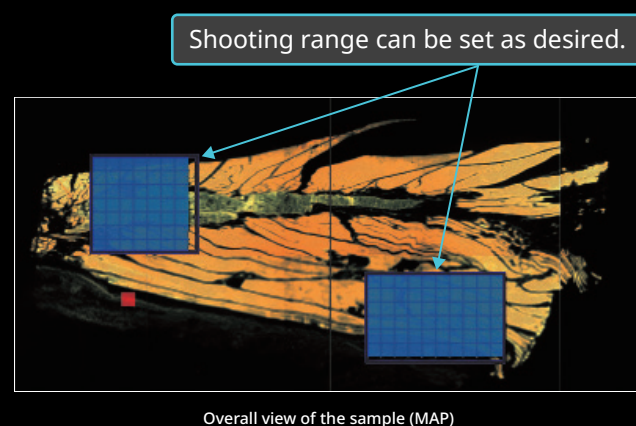
*Image analysis software CellPathfinder is required to use Target Search.

NEW

Map Function

Use your eyes to easily set up the location you want to capture!

- A wide area is simply acquired at high speed to obtain an overall image (Map) of the sample, Drag the mouse on the map to set the acquisition range.
- Multiple acquisition areas can be set in each well and glass slide separately*.
- Significantly reduces the time and effort required to acquire images
- Significantly reduces data volume because unnecessary fields of view are not captured.



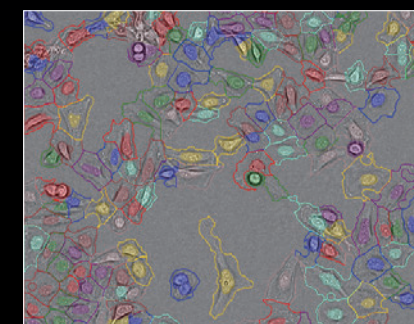
High-Content Analysis Software

CellPathfinder

This software analyzes image data captured with the CV8000, creates graphs, and exports various data. Beginners and experts alike can take full advantage of the software, thanks to a wide variety of templates and flexible protocol editing functions. Yokogawa's unique image generation technology and machine learning functions make label-free analysis possible. The new 3D Viewer and Deep Learning option also greatly improve cell recognition accuracy.

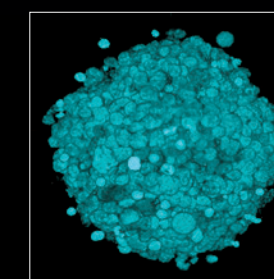
Label-free phenotype analysis

Allows for phenotype analysis without an effect on staining or fixation. Combined with deep learning, classification can be performed with even higher precision.

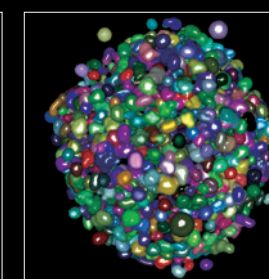


3D analysis of spheroids and organoids

Analyzes Z-stack data to obtain 3D positional and morphological information of the object. The powerful 3D display features allow you to understand the 3D structure of the object as if it were in your hands.



3D image constructed from Z-stack



Object recognition result from image analysis

Image recognition with deep learning

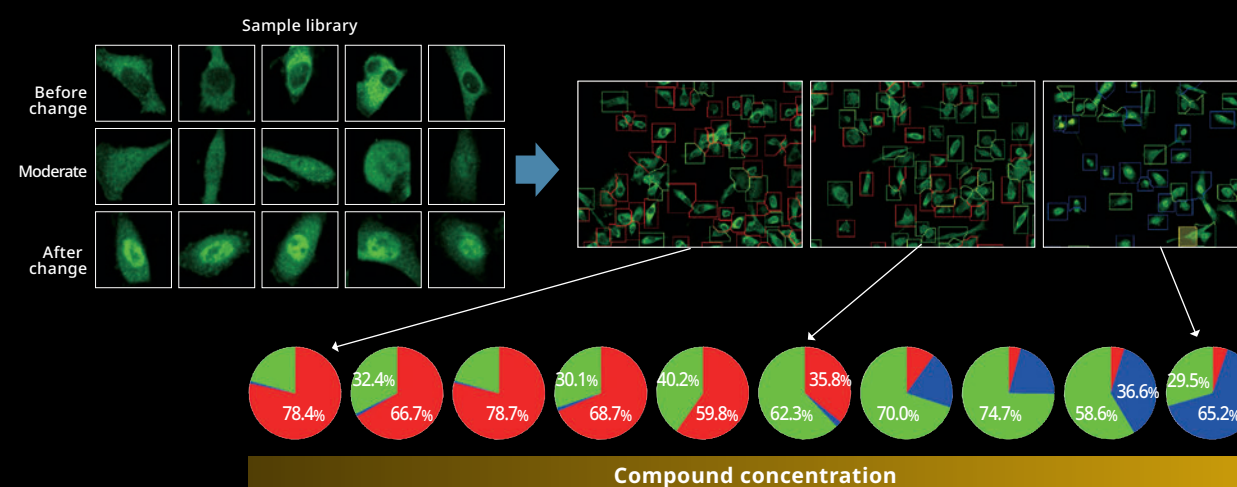
Provides dramatically improved recognition accuracy by recognizing patterns from images and identifying their content.

Learn

Collect training samples simply by clicking on the cells in the image.

Analyze

Test images are analyzed using the resulting deep learning model to classify cells.

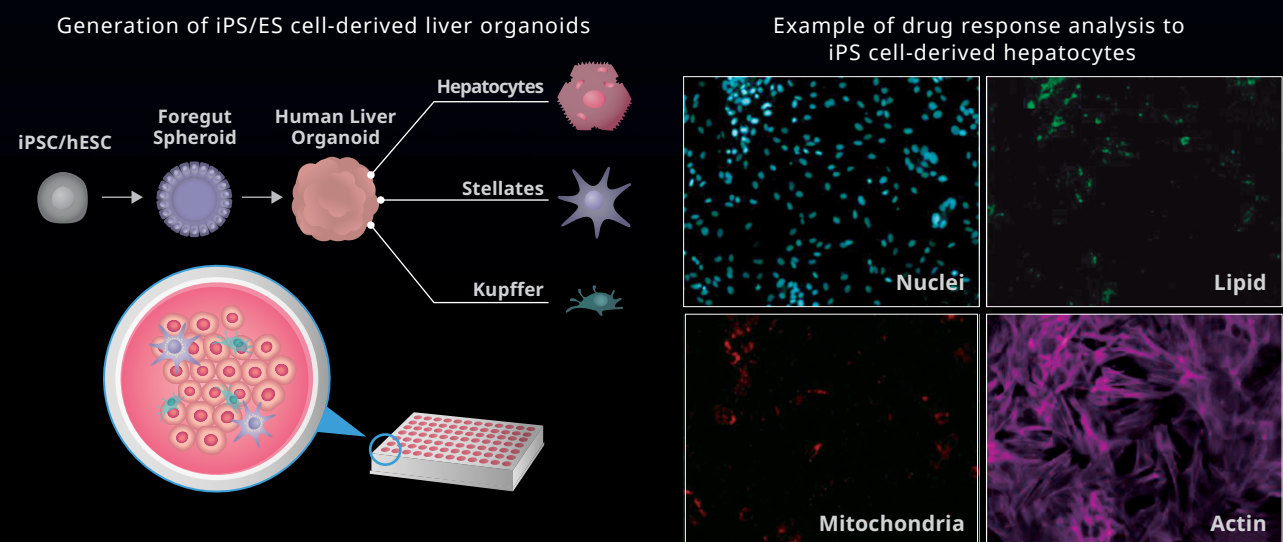




Minimize imaging-related damage to delicate cells

Acquire images while minimizing damage to sensitive cells such as iPS/ES cells and primary cells. You can expect more accurate analysis by minimizing the bias to cells.

• Example of drug screening with human iPS/ES cell-derived liver organoids

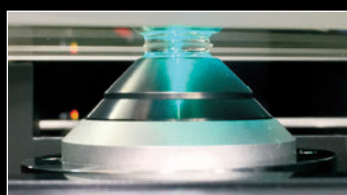


Courtesy of the University of Michigan Medical School

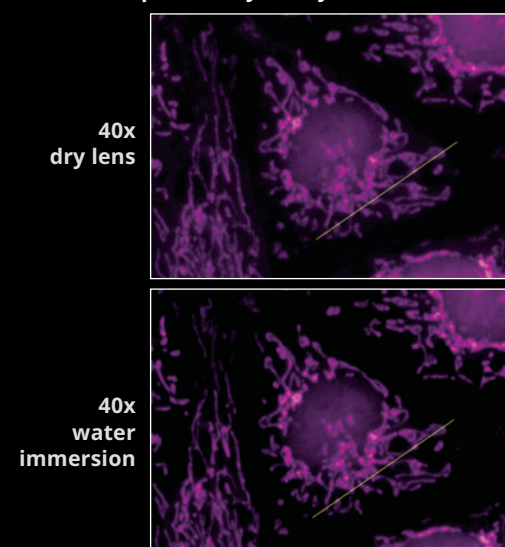
Easy obtaining of high-definition images

Water immersion lens with automatic water replenishment mechanism

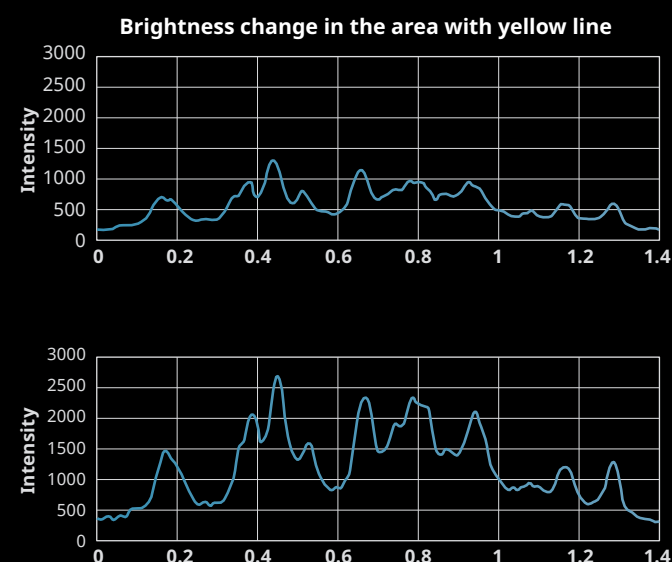
The CV8000 is equipped with an automatic water replenishment mechanism for the objective lens, which employs a Yokogawa original mechanism. The water immersion lenses also provide long time-lapse imaging with less fluorescence fading. Compared to dry lenses, these lenses have a higher NA, enabling acquisition of brighter sample images and greatly contributing to the detection of low-level fluorescence signals.



Bovine pulmonary artery endothelial cells (BPAEC)



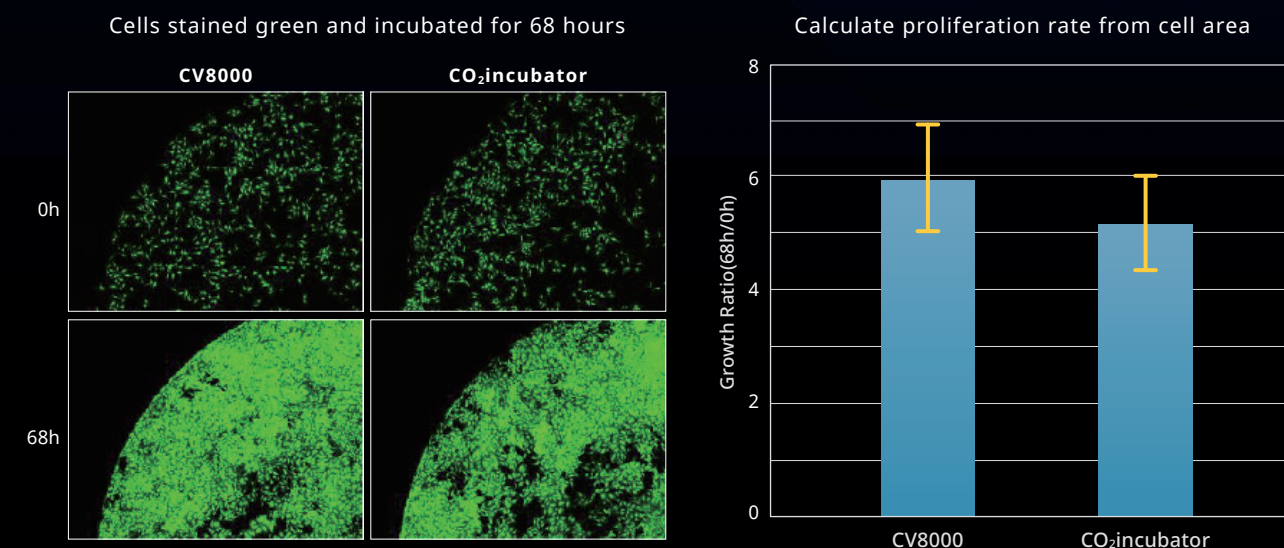
Mitochondria:MitoTracker™ Red CMXRos



Stable observation during long-term incubation

Observation is possible while cells are cultured for long durations with minimal stress, allowing for accurate tracking of cell conditions over long periods.

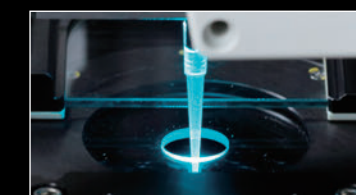
• Comparison of cell growth in the CV8000 incubator and a regular incubator



Capture live cell movement

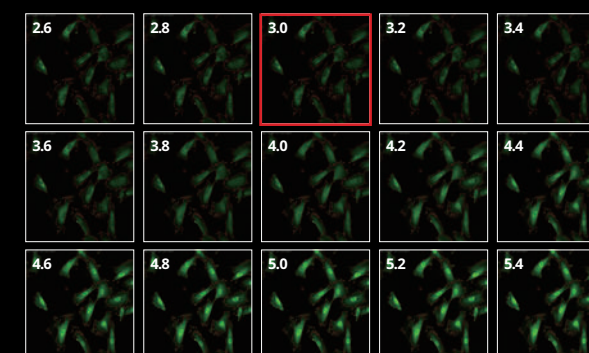
High-precision incubator and pipetter

The stage incubator for samples is hermetically sealed to control humidity, temperature, and CO₂ concentration. The following process is fully automated: built-in tip pickup > reagent collection from the reagent plate > reagent addition to the sample plate > tip disposal. In addition to acquiring images rapidly before and after reagent instillation, the system can add reagent multiple times to a single well and adjust the addition speed, thereby expanding the range of dynamic observation via reagent instillation.

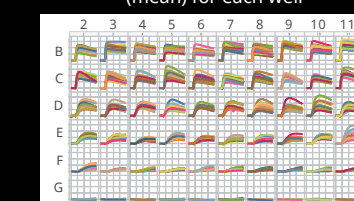
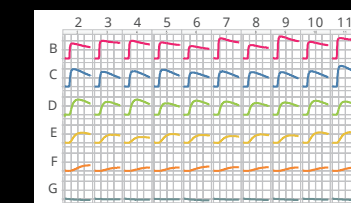


Ionomycin concentration-dependent calcium response

Images can be acquired before and after ionomycin instillation at high speed, and individual cells can be recognized from the images to obtain data on changes over time.

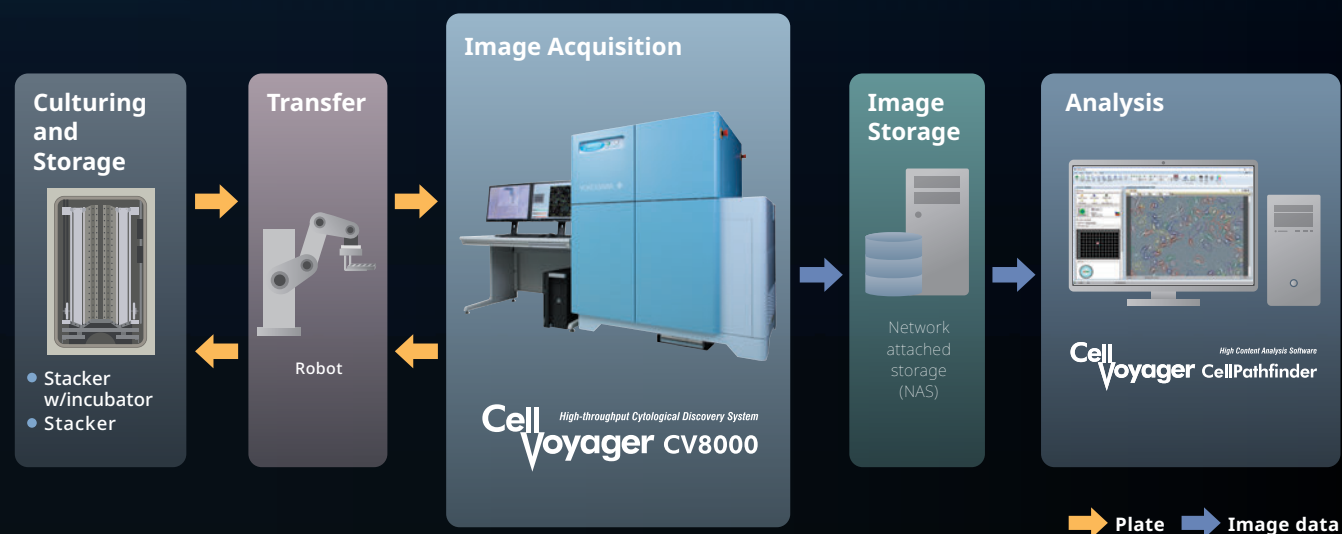


0.2 second interval images (2.6 seconds after imaging start to 5.4 seconds after)
Ionomycin instillation conducted at 3.0 seconds after imaging start (red frame)



Expanding possibilities with system integration

Cell
Voyager CV8000
High-throughput Cytological Discovery System



Installation example

Automation is achieved by linking the automatic pipetter with the CV8000. It is possible to perform everything from imaging to analysis of a large number of samples without human intervention.

Automatic pipetter

CV8000

Transfer robot



Courtesy of Murdoch Children's Research Institute

user voice



The CellVoyager CV8000 has excellent speed and resolution, and because of the large field of view and water objectives, it allows the capture of large numbers of cells for optimal statistical power in single-cell analytics, in both live and fixed experiments. Now, because of the CV8000, we can query larger chemical libraries and number of samples in a manageable and reproducible manner without sacrificing quality of imaging and analytics.

By Dr. Michael Mancini in Baylor College of Medicine

<https://www.yokogawa.com/eu/blog/life-innovation/imaging-single-cell-gene-transcription/>



Now we have two CellVoyager CV8000 fully implemented in our robotic platform, so that we can truly run unattended workflows and measurements overnight or over weekends.

By Dr. Philip Denner in Deutsches Zentrum für Neurodegenerative Erkrankungen (DZNE)

<https://www.yokogawa.com/library/resources/references/deutsches-zentrum-fur-neurodegenerative-erkrankungen/>



Reliable after-sales / Powerful technical support

Our dedicated HCA specialists will provide their utmost support to ensure optimal conditions of Yokogawa products for long-term operation.

Testimonials

"I was really impressed with the skills of the Support Technician, who not only performed analysis, but also gave us advice about measurement protocols based on the analysis. I'm very satisfied with your technical support."

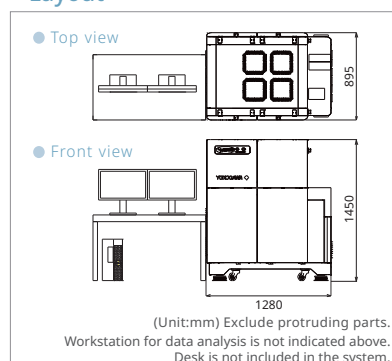
"I'm extremely satisfied with Yokogawa's support system."

"I'm pleased with the very courteous phone support."

Specifications

Model	CV8000
Confocal unit	Microlens-enhanced wide-view dual Nipkow disk confocal scanner, 50 µm pinhole [Option] 25 µm pinhole disk and auto pinhole disk exchanger
Excitation wavelength	405/445/488/561/640 nm, all solid laser, max. 5 lasers (445 nm is for FRET measurement of CFP/YFP) [Option] 365 nm LED
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)
White light illumination	LED
Camera	sCMOS (Effective pixels: 2,000 X 2,000 pixel field of view: 13 mm x 13mm) Max. 4 cameras
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
Sample format	Multiple well plate (6, 12, 24, 48, 96, 384, 1536 wells), Glass slide
XY stage	On observation area, X direction 120 mm, Y direction 80 mm Setting resolution 0.2 µm
Z axis	4 mm from focal reference plane, setting resolution 0.1 µm
Autofocus	Laser-based mode, image-based mode
Stage incubator	Temperature for incubation : 35 - 40°C CO ₂ supply box (CO ₂ : 5 %, forced humidification) [Option] Multi-gas supply unit
Robot pipetter	[Option] Disposable tip type (96tip or 384tip 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)	High Content Analysis Software CellPathfinder Granularity, Neurite, Nuclear morphology, Nuclear translocation, Plasma membrane translocation, Machine learning, Label-free analysis, 3D analysis, Deep Learning, etc.
Output data format	Image data: 16bit TIFF, PNG Numerical data: CSV, original format
On-the-fly compressed analysis	Supports LZW and ZIP formats
Dimensions	Measurement unit: W1,280×D895×H1,450 mm
Weight	Measurement unit: 510 kg
Operating environment	15 - 30°C 30 - 70%RH (No condensation)
Power supply	Measurement unit: AC100-240 V, 50/60 Hz, 2 kVA max Workstation for system control: AC100-240 V, 50/60 Hz, 1,400 W max Workstation for data analysis: AC100-240 V, 50/60 Hz, 1,350 W max

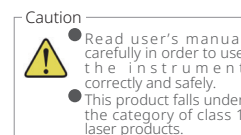
Layout



CellVoyager is sold under license from ThermoFisher Scientific patent portfolio related to High Content Screening and Analysis.

Comparison of High Content Analysis products

	CellVoyager cv8000 High-Throughput Optical Discovery System	CellVoyager High-Content Analysis System CQ3000	CellVoyager CQ1 Confocal Quantitative Image Explorer
Max. # of cameras	4	2	1
Imaging speed (96 wells/4 colors)	1 min	2 min 30 sec	5 min
Max. # of lasers	5	4	4
WI lens	20x, 40x, 60x	20x, 40x, 60x	Unsupported
Robot pipetter	Available as option	Unsupported	Unsupported
25 or 50 µm pinhole adjustment	Available as option	Unsupported	Unsupported



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