KEYENCE

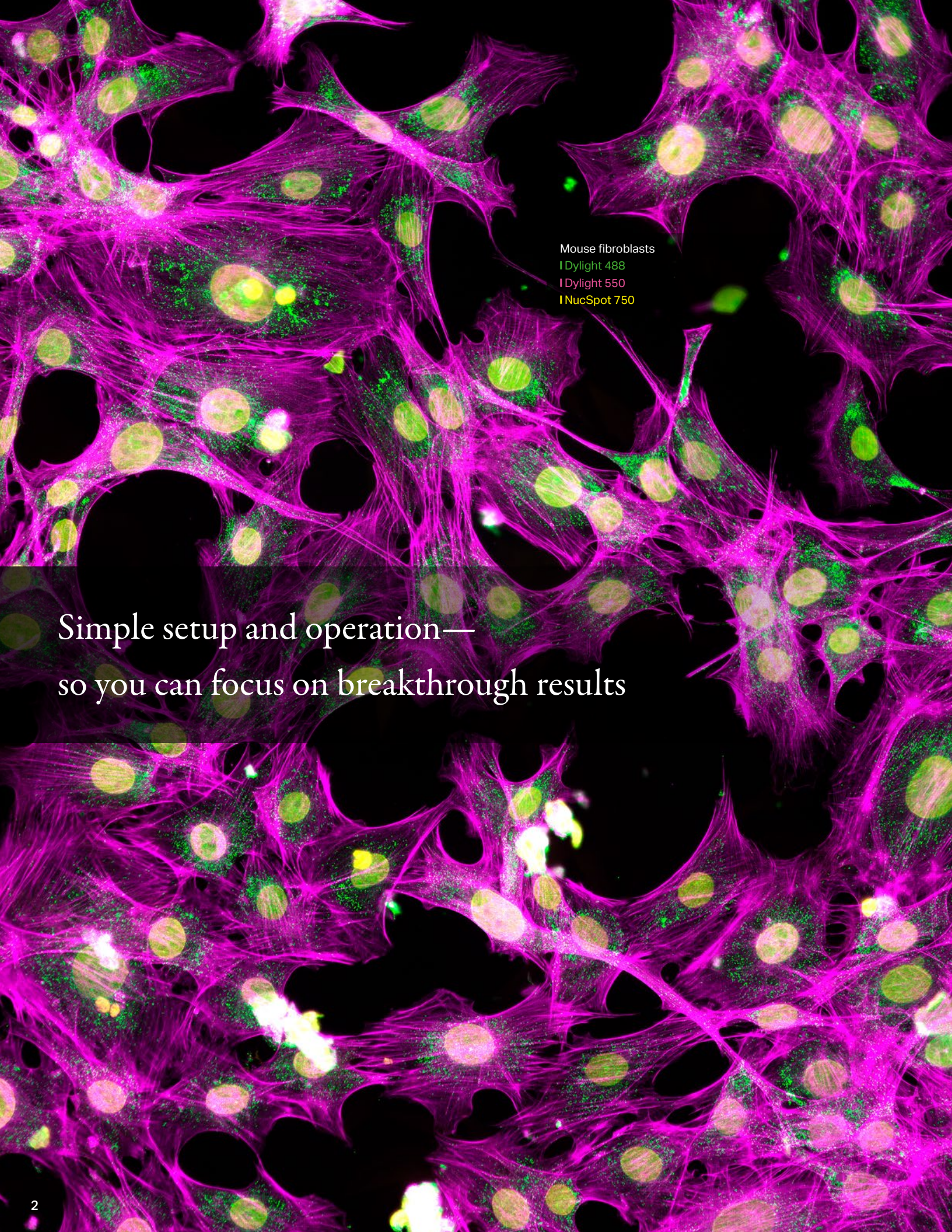
All-in-One Fluorescence Microscope

NEW BZ-X1000 Series

Accelerate your research

Capture images 5× faster with 3.5× more resolution for unmatched publication-quality results.

Modular design with built-in darkroom expands as your research evolves



Simple setup and operation—
so you can focus on breakthrough results

High-Speed Acquisition

Revolutionary filter wheel captures images 5× faster

Imaging speed not only impacts the number of samples that can be viewed but also what experiments can be performed. Our new filter wheel allows for high-speed fluorescence imaging, while our dual-filter system lets you capture with up to 11 channels.

- High-speed motorized filter wheel NEW
- Dual filter system NEW

→ P. 8

High-Resolution Imaging

10-megapixel CMOS camera

The high-resolution 10-megapixel CMOS camera maximizes the performance of the lenses for accurate imaging of microscopic structures to provide next-level, publication quality images.

- Monochrome CMOS camera NEW
- 6-channel multi-color filter turret NEW

→ P. 10

Easy-to-Use

Intuitive design built for all users

A simple interface combined with advanced support functions and a variety of imaging and analysis features allows both experienced professionals and first-time users to easily gather research paper quality data and images.

- Auto-navigation NEW

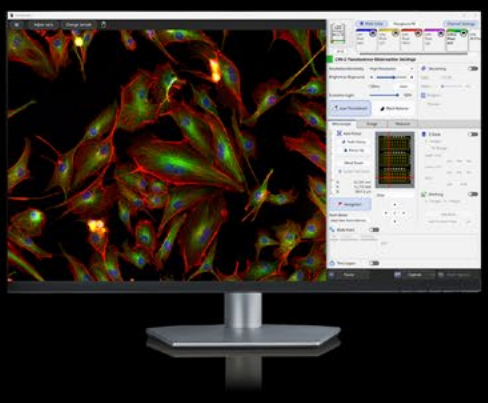
→ P. 14

- Modular design

→ P. 18

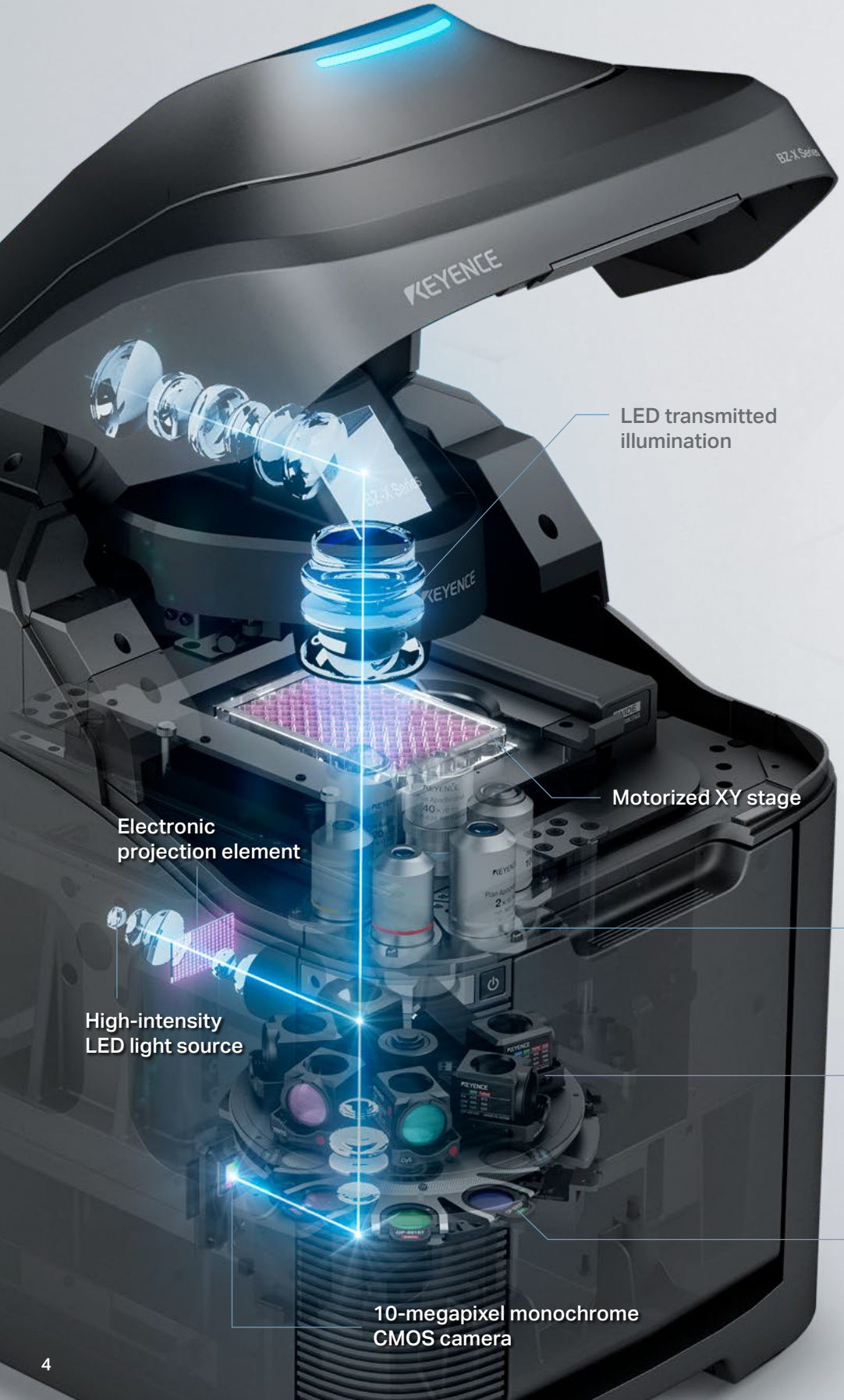
All-in-One Fluorescence Microscope

NEW **BZ-X1000 Series**



All-in-One System

Exceptional performance for reliable image quality and work efficiency



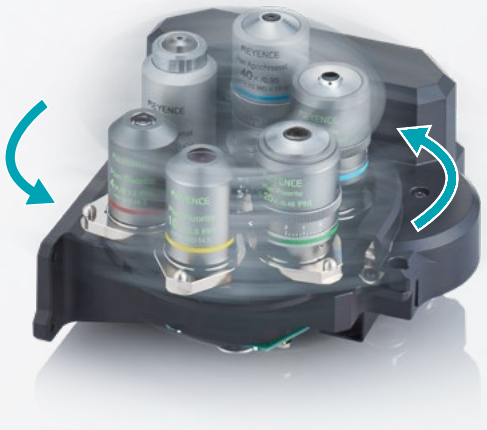
ALL IN ONE

No darkroom required

Experience optimal fluorescence observation without the hassle of sitting in the dark. Our system eliminates ambient and stray light, creating the ideal darkroom environment within the device, and its compact design allows for installation on any standard lab bench.

Fully-motorized control

Every function—from field navigation and focus adjustment to imaging parameter setup—is fully motorized and streamlined for efficiency. The system is designed to minimize steps and maximize usability, allowing both experienced users and first-time operators to capture high-quality images quickly and confidently.



Publication-quality images and data in one tool

Equipped with a 10-megapixel monochrome CMOS camera, high-powered LED light source, and high-speed motorized filter wheel, the system delivers outstanding imaging quality and throughput. Whether you're conducting large-scale preliminary studies or capturing publication-ready images, this all-in-one fluorescence microscope is built to handle it all.

Modular design evolves with your research needs

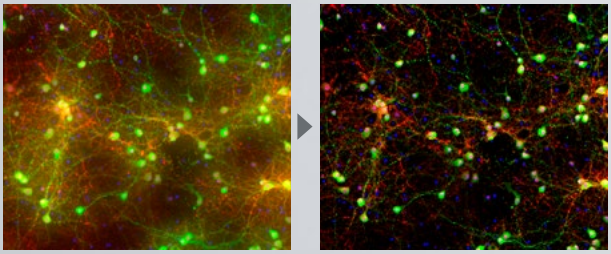
Tissue imaging

Image stitching	Z-Stack	Quantification	3D analysis

Quantitative analysis of whole tissue sections

Area percentage: 8.3%

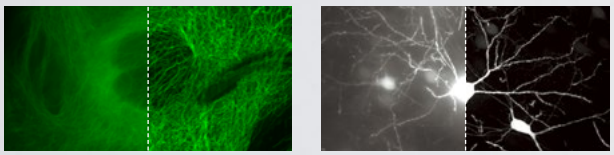
Optical sectioning of thick fluorescence-stained samples



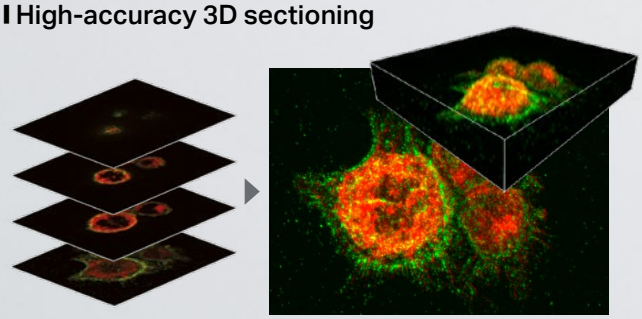
Cell imaging

Single-cell imaging	3D analysis	Near-infrared imaging	Localization analysis

High-magnification, high-resolution imaging of microstructures



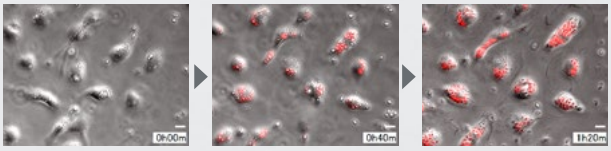
High-accuracy 3D sectioning



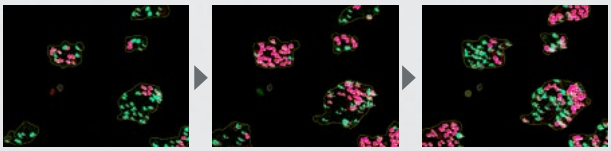
Live-Cell imaging

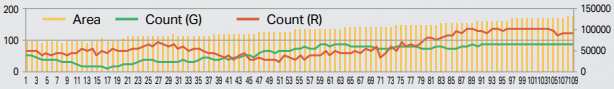
Time-lapse	Calcium imaging	Time-series analysis	Video capturing

Time-lapse with phase contrast and fluorescence overlay



Quantitative analysis of fluorescent signal changes over time

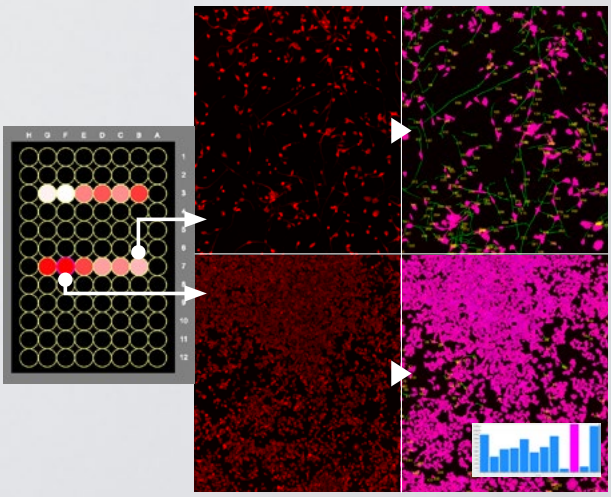




Microplate assays

High throughput	Plate scanning	Screening	Batch imaging and analysis

Multi-well plate analysis



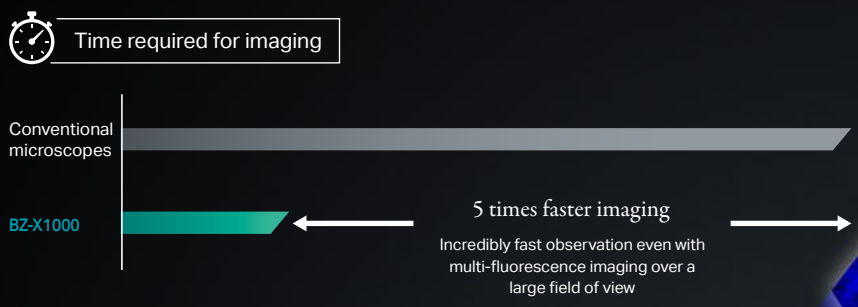
Expand the capabilities of your lab without any hardware modifications

All necessary hardware for the various software modules has already been pre-installed, enabling immediate use by simply activating the desired functions.

No equipment modifications or recalibration are required so that advanced analysis and imaging modules can be added and used at any time.

Revolutionary filter wheel captures images 5× faster

Faster capture time compared to conventional microscopes - accelerating research time without comprising data quality



5 times faster than conventional microscopes

High-speed motorized filter wheel NEW

A newly integrated filter wheel enables independent control of excitation and emission filters, allowing for high-speed channel switching. This not only significantly reduces imaging time but also captures dynamic reactions in live samples—such as live cells and organoids— as they occur. As a result, both data quality and sample size can be improved simultaneously.

Expanded imaging options

Dual filter system for purpose-specific applications NEW

By combining the filter wheel and built-in filter turret, the dual filter system supports six additional channels. While the filter wheel meets the demands for faster channel switching, the filter turret allows for improved sensitivity. Both filters can be used together, making choosing the best imaging method incredibly easy and flexible.

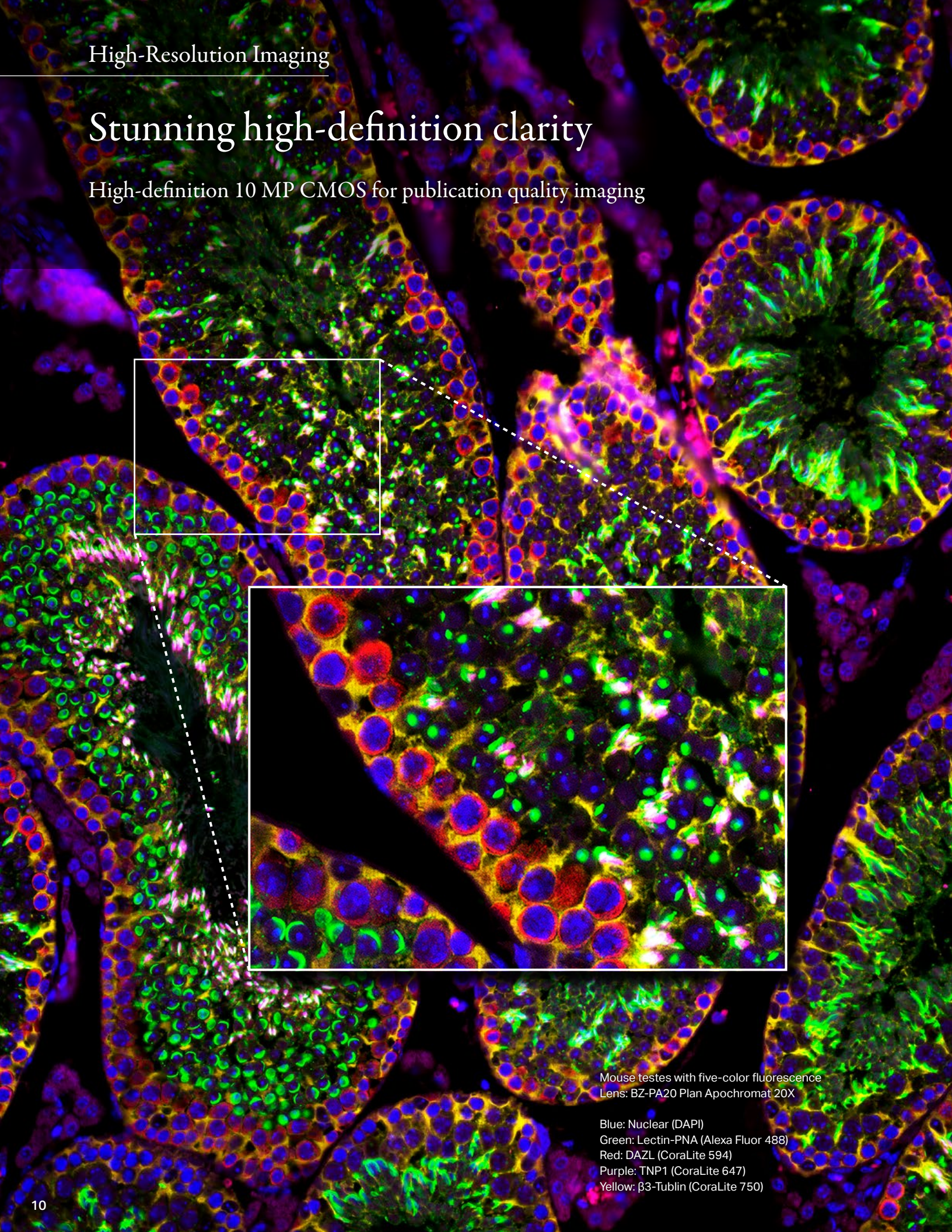
Up to 11 configurable channels NEW

The filter wheel enables imaging configurations for up to 11 channels at a time, supporting a wide range of wavelengths—even when combining fluorescence, brightfield, and phase contrast imaging. By assigning specific wavelengths to each filter and setting up channels in advance, users can seamlessly switch between a range of applications without the need to attach or remove filters. Frequently used channels can be displayed selectively, and user-specific display settings can be saved, making it easy to apply optimal configurations for each application—even in shared, multi-user environments.

Example of display with all 11 channels

Stunning high-definition clarity

High-definition 10 MP CMOS for publication quality imaging



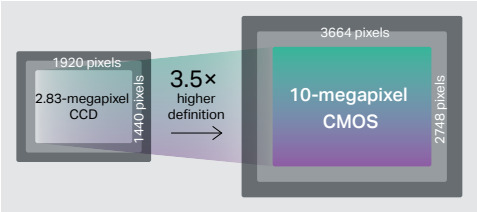
Mouse testes with five-color fluorescence
Lens: BZ-PA20 Plan Apochromat 20X

Blue: Nuclear (DAPI)
Green: Lectin-PNA (Alexa Fluor 488)
Red: DAZL (CoraLite 594)
Purple: TNP1 (CoraLite 647)
Yellow: β3-Tublin (CoraLite 750)

Remarkable high-definition, high-sensitivity observation

High-resolution 10-megapixel monochrome CMOS NEW

The 10-megapixel monochrome CMOS camera offers 3.5 times the detail compared to conventional microscopes, enabling high-definition, high-sensitivity imaging with a 2/3" sensor. This high-precision optical system clearly renders every detail of the sample in bright, high definition.

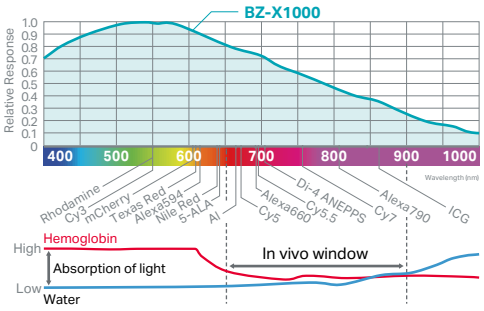


Broad spectrum imaging with exceptional clarity

With a high-performance camera and advanced LED light source, the system supports imaging across a broad wavelength range—from ultraviolet to near-infrared. Flexible fluorescence filter selection tailored to your reagents and antibodies enables high-sensitivity, high-definition imaging with minimal crosstalk—even in complex, multi-channel experiments with more than four fluorophores.

In vivo window

The 650 to 900 nm wavelength range is referred to as the "in vivo window." With low levels of autofluorescence and light scattering in this range, long-wavelength fluorescent dyes are ideal for visualizing deep regions of living tissue.



Advanced optics for high-definition imaging

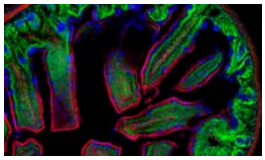
6-channel multi-color filter turret NEW

Up to six filter cubes can be installed for imaging over a wide range of experiments. The tool-free, one-touch design makes replacing a filter cube fast and easy when using special reagents. Switching channels is also significantly faster than conventional systems, enabling fast, high-sensitivity, multi-color imaging.

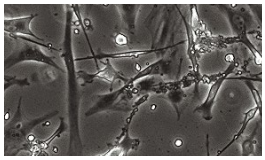
Specialized objective lenses

High transmittance over a wide range of wavelengths allows bright, high-contrast imaging. Observation is possible even with a low level excitation light, minimizing damage to samples while preserving bright and colorful fluorescent images for a longer time.

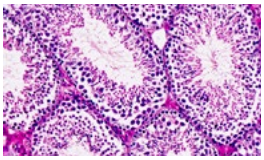
Fluorescence



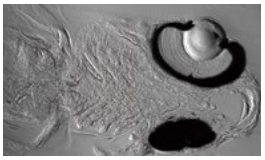
Phase contrast



Brightfield



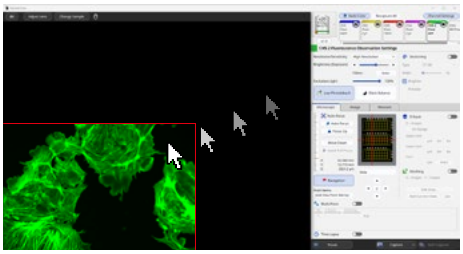
Oblique Illumination



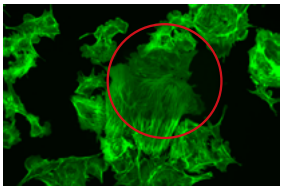
Advanced functionality for a wide range of samples

Low photobleach mode

When changing the focus or field of view, the excitation light is pulsed only long enough to display an image. The excitation light is then blocked until another adjustment is made, minimizing photobleaching and prolonging the life of the specimen.



Conventional observation method



Photobleaching during high-magnification observation leads to sample damage with irregularities in brightness

Low photobleach mode

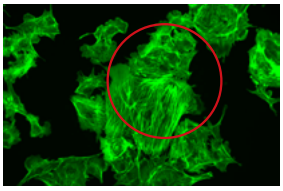
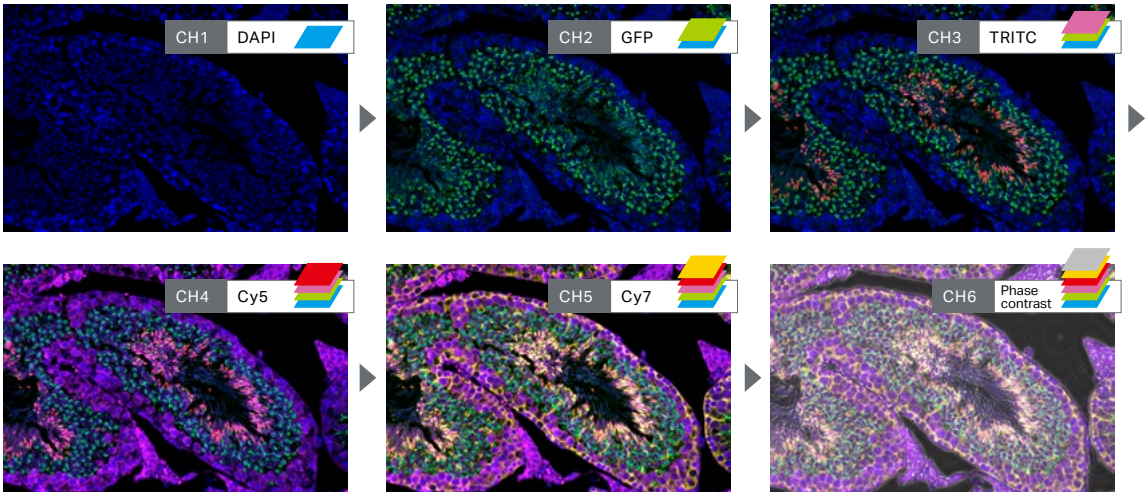


Image with less photobleaching and even brightness

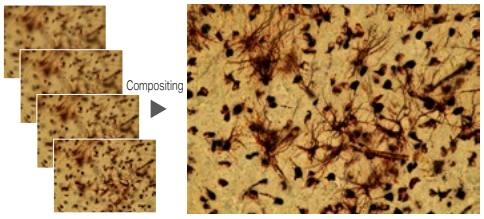
Real-time overlay

Capture settings such as focus and exposure time on an overlaid image can be viewed and adjusted prior to image capture. On a conventional system, a multi-channel overlay would need to be captured, adjusted, and recaptured to obtain the desired result. The BZ-X1000 Series saves time by providing a real-time overlay prior to image capture.



Automatic full focus

With a single click, the system automatically scans the thickness of the sample and creates a fully focused composite image in real-time. This enables understanding of the whole image even for thick targets or those with height differences.



One-click automatic focusing

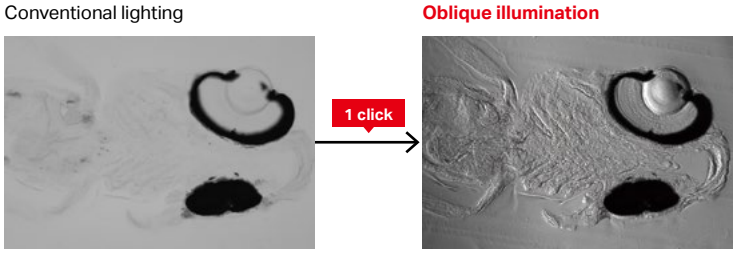
Fully-focused image

One-click monochrome/color switching

Switching between color and monochrome imaging modes is effortless with a single click, making it easy to select the optimal settings for each sample. Use the high-sensitivity monochrome mode for fluorescence and phase contrast imaging, or switch to the high-reproducibility color mode for brightfield applications such as HE and DAB staining. The color mode also features specially optimized lighting to deliver vivid, true-to-life color reproduction, enhancing the accuracy of quantitative evaluations—such as counting positively stained cells in malignant tumor analysis.

Enhance contrast of unstained transparent specimens

Observe images similar to those obtained by using differential interference contrast (DIC), but without any additional lenses, prisms, or other hardware. Unlike DIC, this technique can be performed through plastic containers, making it suitable for observing ova and other clear specimens.



Intuitive design built for all users

Fully electronic system for simplified operation of even advanced functions

Support for a wide variety of vessels

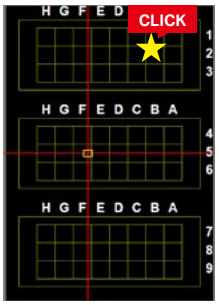
Sample holders compatible with a wide range of vessels—including slides, dishes, flasks, and multi-well plates—enable efficient and reliable imaging, regardless of container type. The newly designed sliding holder framer further streamlines workflow by allowing rapid sample exchange, making it easy to observe even large batches of samples quickly.

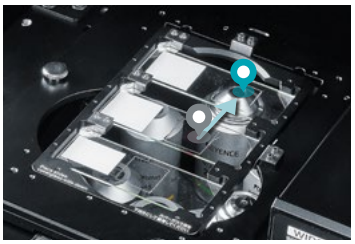
Real-time composition interface

Auto-navigation NEW

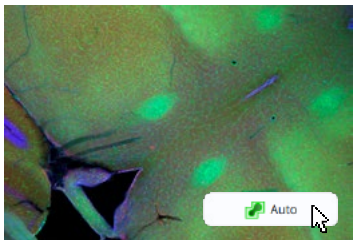
Simply move the specimen to within the field-of-view and press a button to begin automatic scanning. The system will automatically recognize the shape of the specimen and scan only the necessary areas to quickly create a complete navigation image. By linking the XY coordinates and field of view size to the navigation image, the frame size can be automatically changed according to the field of view whenever the magnification is adjusted, making it easy to determine which part of the specimen is being displayed.

STEP 1 Move to the desired location using the stage view



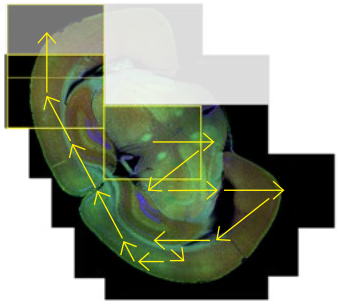


The map and motorized stage are encoded to instantly move to the desired location at the click of a button.



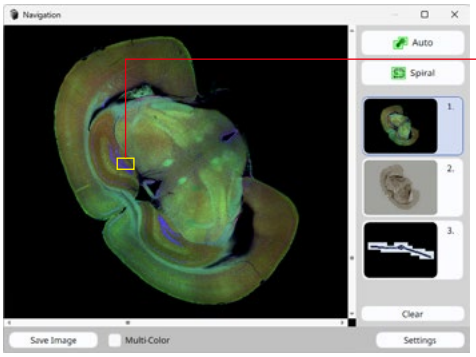
Press the "Auto" button anywhere on the specimen to begin scanning.

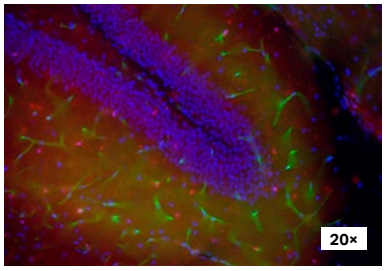
STEP 2 Use auto-navigation for a fast, efficient preview of the entire specimen



After the shape of the specimen is identified, the camera captures images while skipping any location with no specimen or signal present, allowing the entire specimen to be captured quickly and reliably. Navigation images can be created for both brightfield and phase contrast observation. For specimens with fluorescent signals scattered irregularly across the surface, the scanner can check the specimen by capturing the surrounding area in a spiral pattern centered on the scan starting point.

STEP 3 Use the high-precision map with linked coordinates and large field of view to streamline observation



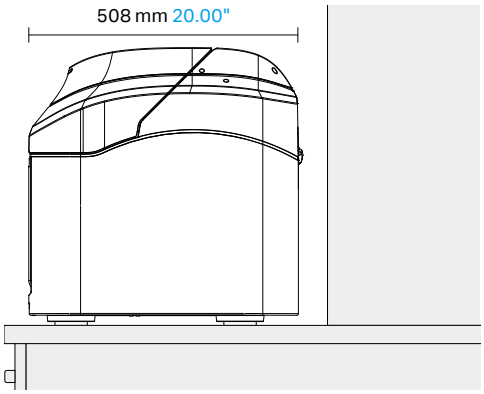


Quick adjustments to the field of view are possible even at higher magnifications. Acquired navigation images can also be saved or output as image files.

Compact design for installation anywhere

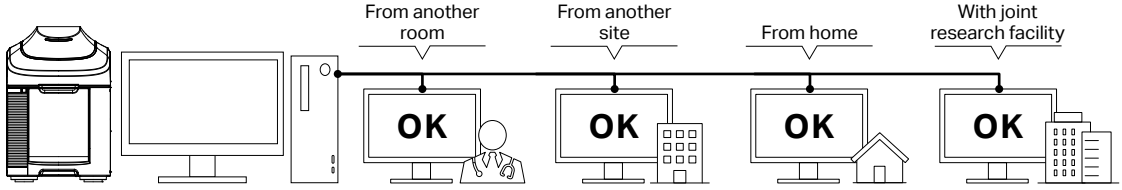
Built-in darkroom

Clear fluorescence observation with minimal background noise is achievable even in brightly lit environments — simply place your specimen and close the lid — no darkroom required. Designed to fit on a standard lab bench, this compact system delivers high-end performance in a small footprint and reduces the risk of contamination or spills when moving samples to the darkroom. A motorized XY stage supports full well plate imaging, while a built-in vibration isolation mechanism ensures stability during observation. Combined with advanced optical components, the system is engineered to support high-throughput workflows and meet the demands of modern research environments.



Supports remote operation

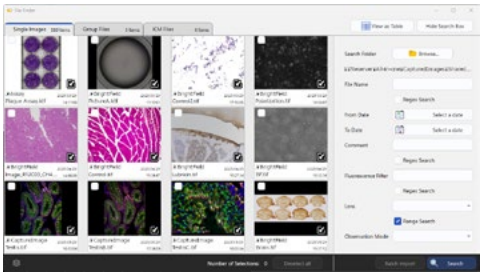
Fully motorized control with network connectivity enables complete remote operation, allowing observation and analysis to be conducted collaboratively with off-site research teams. This enhances communication, accelerates decision-making, and shortens research timelines. Remote access also boosts lab efficiency in high-safety environments where direct interaction is limited or restricted.



Data-driven support for advanced research development

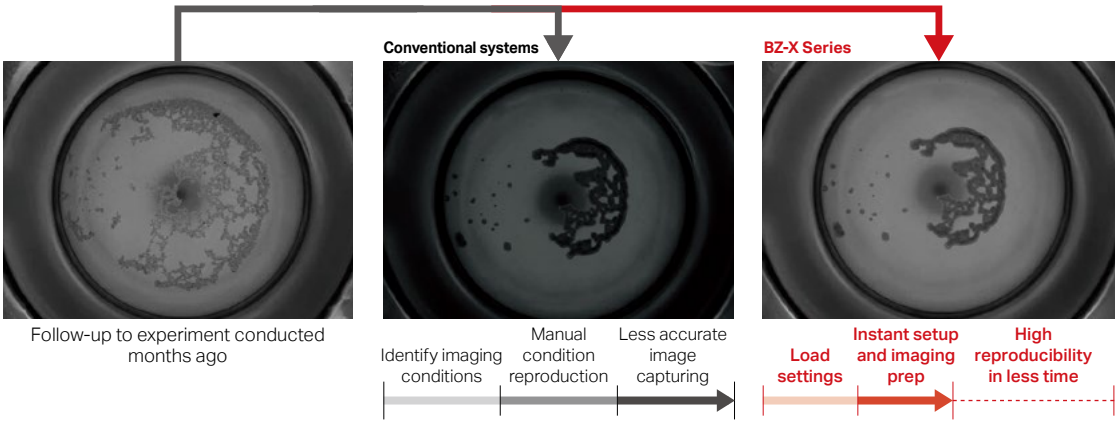
File Finder function NEW

Quickly search captured image data using various criteria such as fluorescent filter type and lens magnification. The ability to refer to actual imaging conditions allows for efficient use of important asset data for follow-up and reproduction of experiments.



Capture condition reproducibility

Imaging conditions—including filter settings, magnification, exposure time, and capture position—can be automatically retrieved from image data and applied within the observation application. This ensures consistent, accurate comparisons over time and minimizes user-to-user variability. By removing subjectivity, a common barrier to reproducibility, the system supports reliable, repeatable observations.

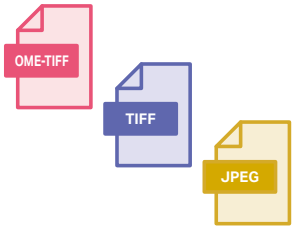


Users must keep track of capture settings such as location coordinates and exposure time, and then manually adjust these settings in future captures. This takes time and increases the risk of incorrect settings.

The File Finder function makes it easy to quickly find the desired image even from a large amount of data. Various settings can then be reproduced instantly from the image, saving time and ensuring accurate imaging under the same conditions.

OME-TIFF output for 3rd party integration NEW

Images can be saved in OME-TIFF, a multi-layer TIFF file that includes OME metadata. This format can then be read with 3rd party software such as ImageJ, allowing data captured with the BZ-X1000 to be edited and analyzed with any commonly used software. Conventional TIFF and JPEG formats are also supported, enabling color previews using Windows' standard image viewer, providing both compatibility with advanced technologies and greater usability.



Enhanced Observation and Analysis

Expandable to support diverse applications while maintaining ease-of-use

The built-in configuration includes all of the hardware required for the optional modules.
Upgrades are easy and fast for on-demand expandability. The software interface remains the same as modules are added, allowing users to easily operate the system after upgrading.

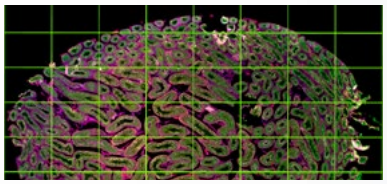
Observation and Capture Modules

BZ-H5XJ

Stitching and Multi-Point Imaging Module

Multi-dimensional imaging, including high-density image stitching and multi-point condition settings.

P.20

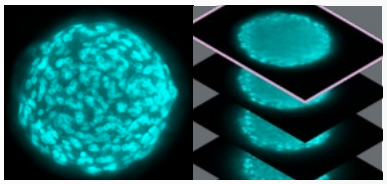


BZ-H5XZ

Z-Stacking Module

Z-stack imaging between upper and lower limits.

P.22

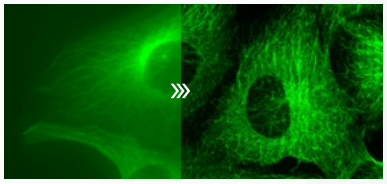


BZ-H5XF

Sectioning Module

Optical sectioning capture with structured illumination.

P.24

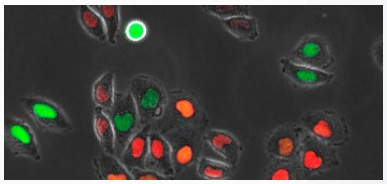


BZ-H5XT

Time-lapse Module

Automated capture at user-specified intervals for video and time-series measurements.

P.28

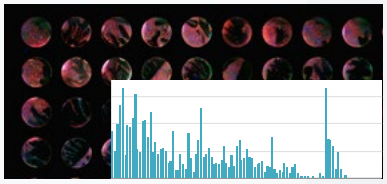


BZ-H5XI

Image Cytometer Module

Batch capture and analysis of large amounts of data, including well plates.

P.30



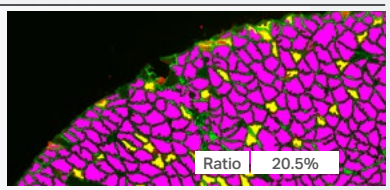
Analysis Applications

BZ-H5C/BZ-H5CM

Hybrid and Macro Cell Count

KEYENCE's original algorithm enables accurate quantification of image data.

P.32

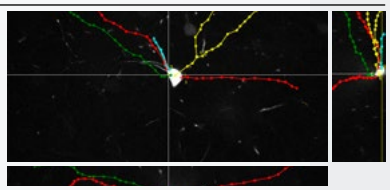


BZ-H5R

3D Application

Creation of 3D images from Z-stack data. 3D measurement of localization and configuration available.

P.36

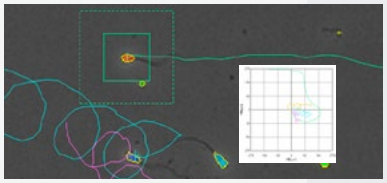


BZ-H5K

Motion Analysis Application

Tracking of user-specified targets to measure travel range, speed, and coordinate positions.

P.38



BZ-H5M

Measurement Application

Manual 2D measurements, including area.

P.39

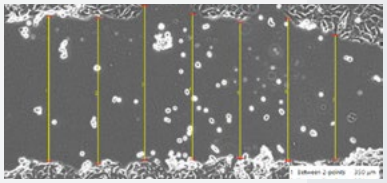
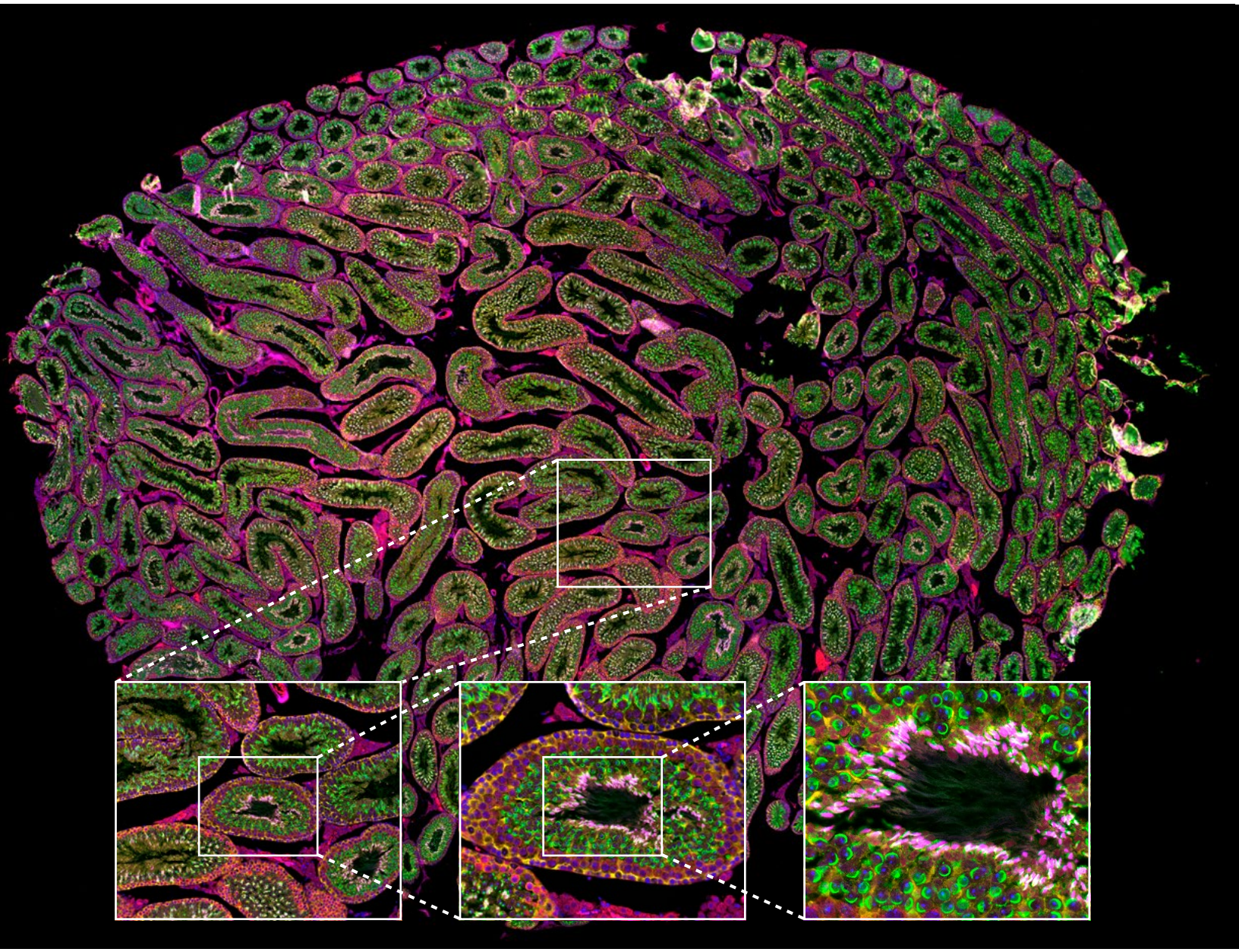


Image Stitching

High-Speed Capture of High-Resolution, Wide-Area Images

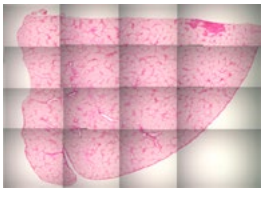
Viewing a specimen at high-magnification often requires an expansive viewing area beyond a single field of view. Image stitching allows the user to easily capture an entire specimen at high-magnification, and seamlessly create a single high-resolution image. Up to 50,000 × 50,000 pixels can be rapidly joined together without stitch lines or brightness variations. Images can be captured seven times faster than that of conventional methods.



High precision shade correction

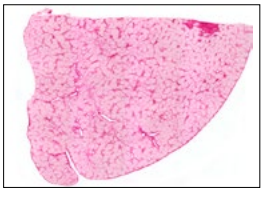
Uneven light intensity caused by lens aberration or non-uniform light sources appear as seams in the stitched image. This results in an unnatural appearance and affects the accuracy of quantification. The BZ-X Series eliminates uneven light intensity with its high-precision shade correction algorithm in order to create seamless, high-resolution images.

Conventional stitched image



Uneven light intensity causes stitch lines

BZ-X Series stitched image



Shade correction eliminates stitch lines

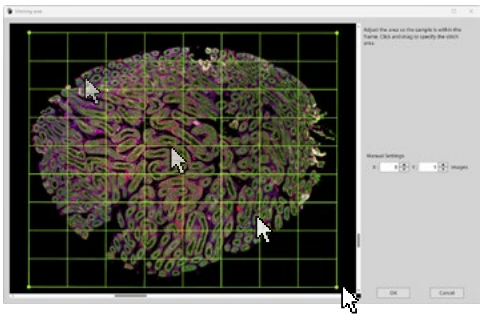
Experience the impressive resolution for yourself!

Easier, more accurate image stitching

Area editing

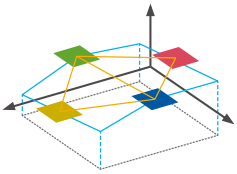
Navigation-based image stitching

By using the Navigation function to pre-register the specimen shape, setting the capture range becomes as simple as dragging your mouse. Say goodbye to missed areas—no more retaking images because part of the sample was left out.

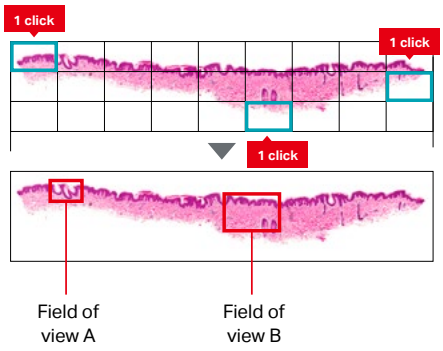


Focus-adjusted image stitching

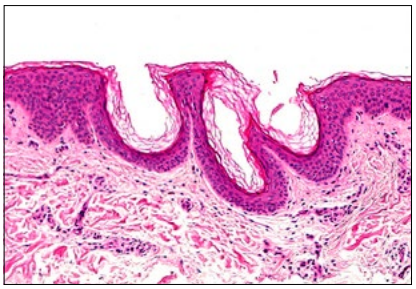
Set XYZ positions for fast, focused stitching



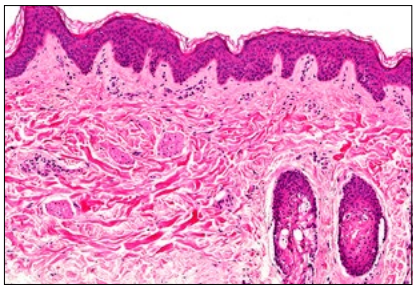
By registering a few points along the specimen's edge using the navigation image, the system can automatically adjust focus based on height variations and distances between points—even if the focus position shifts. This allows for fast acquisition of a few fully focused, wide-field images.



Field of view A



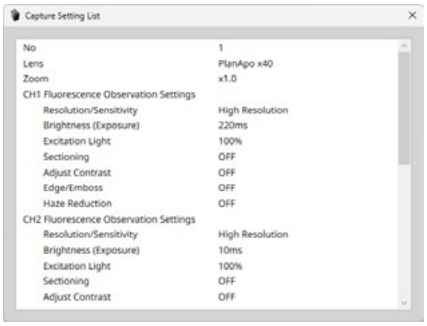
Field of view B

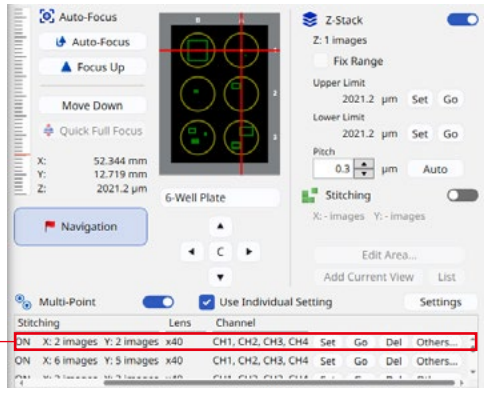


Multi-point & multi-condition capture

Efficient imaging of multiple specimens

Store up to 999 capture points with support for simultaneous Z-stacking and image stitching. Capture settings can be configured individually or applied to multiple points at once, offering flexibility as needed. Setting a point is as simple as pressing the [Set] button at the desired location. You can also adjust capture conditions later, ensuring efficient and error-free imaging.

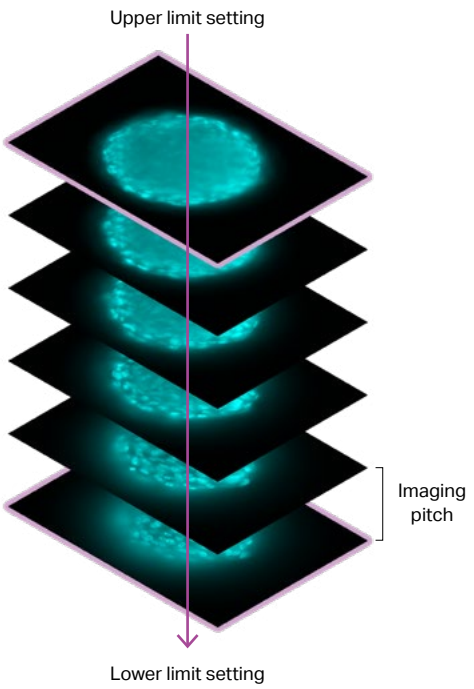




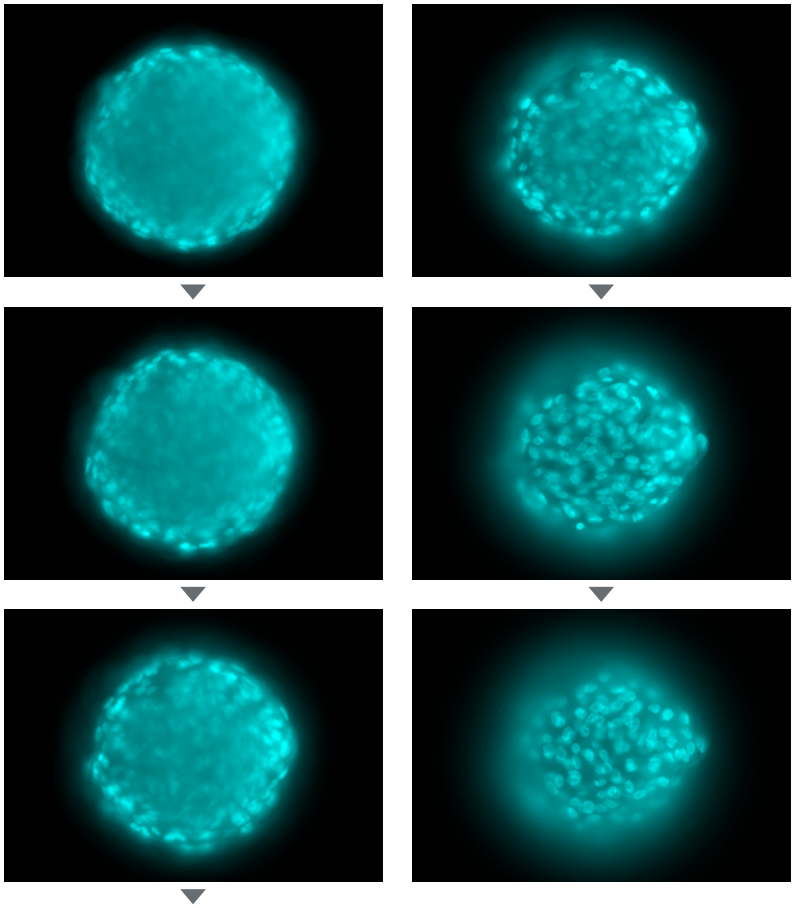
Z-stacking

High-speed, high-accuracy visualization of 3D structures

The highly accurate motorized Z stage enables quick, evenly spaced Z-stack data capturing. Captured Z-stack data can then be imported as a single integrated image. Different points along the Z-axis in the same field of view can also be viewed as separate images using the slide bar or mouse wheel.

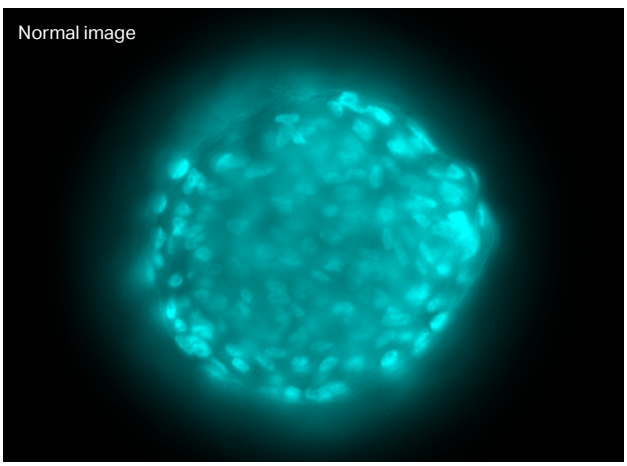


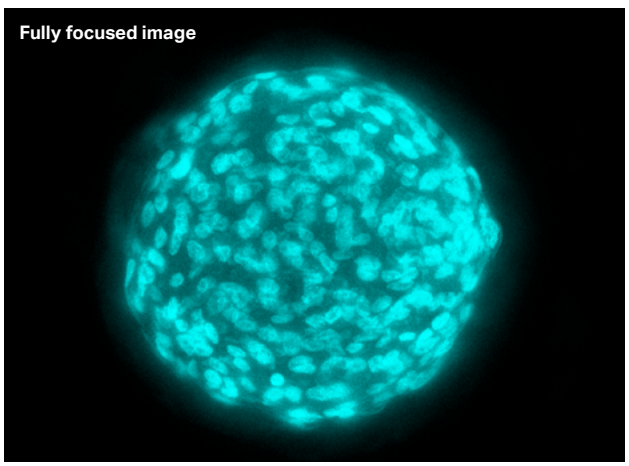
Spheroid Z-stacked image (0.5 µm pitch × 69 images)



Full focus

Captured Z-stack data can be combined to create a single image of all Z-axis positions in focus with just a single click. This is incredibly useful not only for obtaining an overall view of a three-dimensional specimen, but also for correcting a partially distorted tissue section that is out of focus.





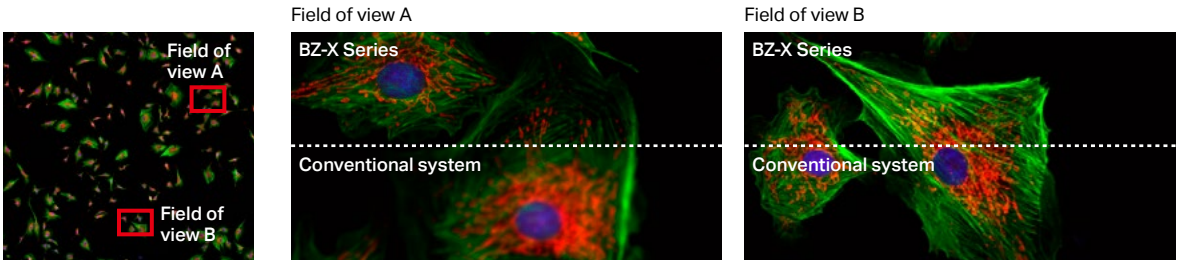
Combine software modules for enhanced multi-dimensional imaging and analysis

BZ-H5XZ Z-Stacking Module × BZ-H5XJ Stitching and Multi-Point Imaging Module

Auto-focus image stitching

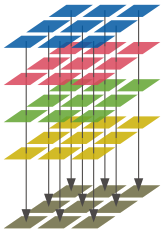
Sharp focus for uneven or distorted samples

Auto-focus can also be used when capturing data using image stitching. Although a wider stitching range can result in a greater risk of misfocusing for some specimen shapes, auto-focusing makes it possible to capture in-focus images throughout the stitching range. Auto-focus image stitching also helps reduce the total number of images that need to be captured.

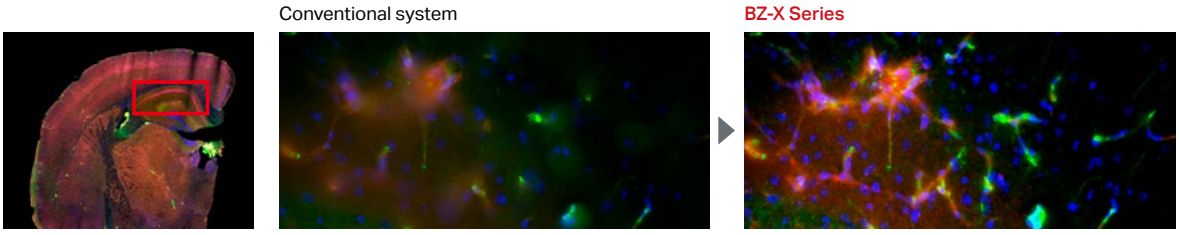


Z-stack image stitching

Fully automatic Z-stack image stitching



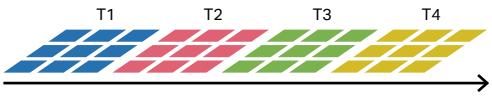
Using Z-stacking throughout the stitching range results in a large amount of data being obtained. Batch image stitching makes it possible to read specific height data as grouped data, making it possible to utilize the high-resolution stitching data for 3D information analysis. This means fully focused stitching can also be used to create a wide-area stitched image with all heights throughout the sample in focus.



BZ-H5XJ Stitching and Multi-Point Imaging Module × BZ-H5XT Time-lapse Module

Image stitching time-lapse

Automated image time-lapse stitching

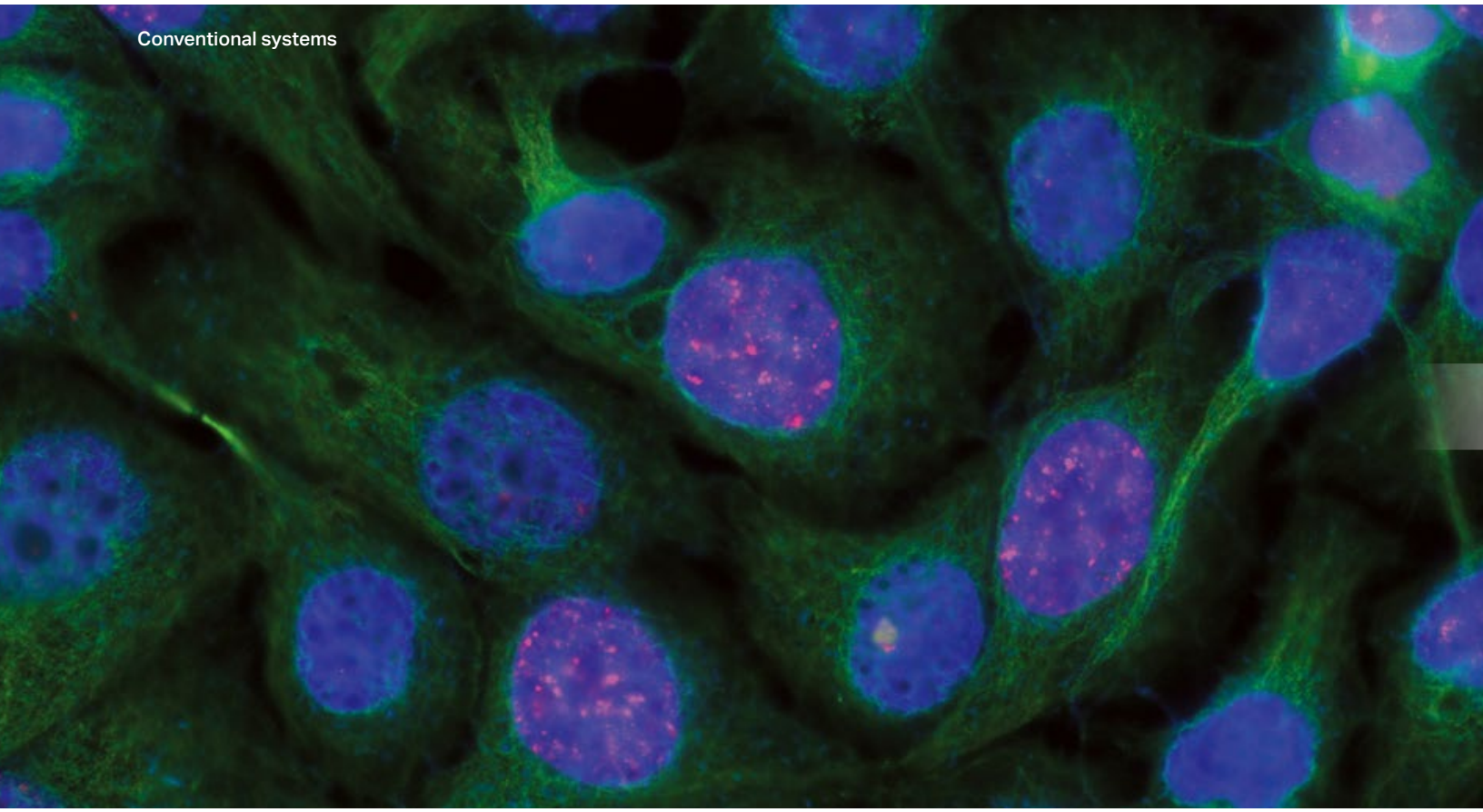


Just like Z-stack image stitching, batch stitching of all the data from each time point is possible. This function is incredibly useful for studying cell behavior, fluorescent signal output, and relationships with the surrounding environment over a wide area without sacrificing magnification or resolution.

Optical Sectioning

Capture Clear Images Without Fluorescence Blurring

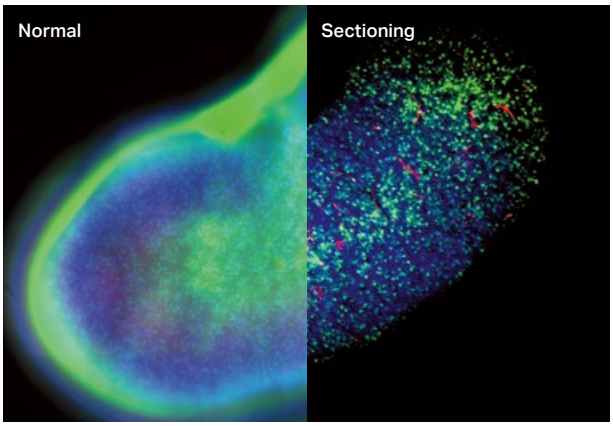
Easily capture high-definition images without blurring caused by out-of-focus signals. The unique optical sectioning technology in the BZ-X Series uses an electronic projection element for structured illumination. Operation is simple and intuitive, allowing even first-time users to capture publication-quality images in seconds.



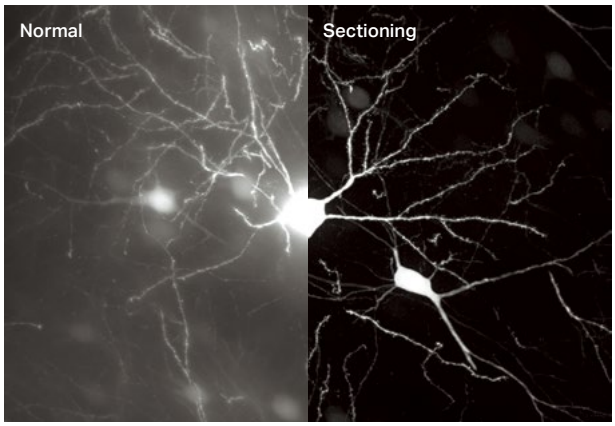
Clear imaging of thick specimens

Optical sectioning accurately detects fluorescence signals in the desired focal plane, providing clear optical slices of thick samples. A wide range of samples, including animal cells, plant cells, and cultured tissue can be easily observed.

Kidney, whole mount

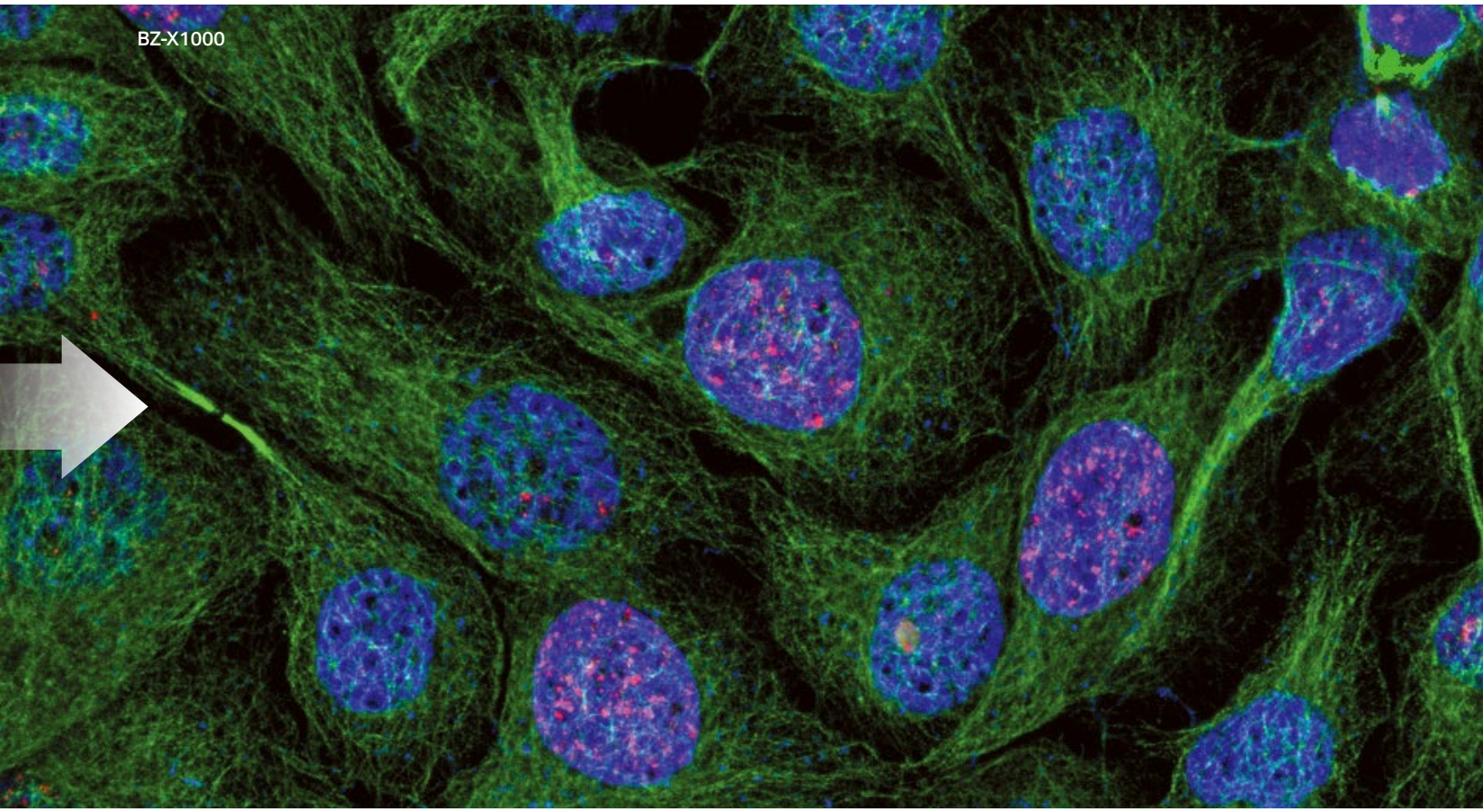


Mouse cranial nerves (transparent samples)



Take a look at the effects of optical sectioning ▶

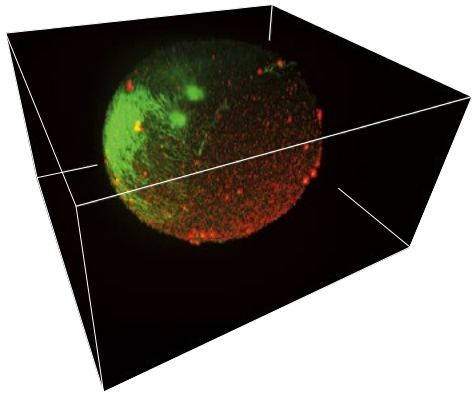
Tubulin and γH2AX Courtesy of Momoko Ishikawa, Department of Pediatric Dentistry, Tohoku University Graduate School of Dentistry



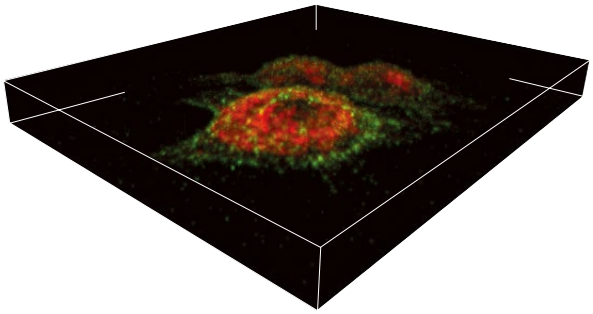
3D localization analysis

Optical sectioning provides high-accuracy, cross-sectional images without fluorescence blurring from other focal planes. Clear Z-stacks can then be transformed into realistic 3D renderings, allowing for accurate localization analysis.

Ascidiacea egg



HEK293 cell



Courtesy of Assistant Professor Taku Uchida, Graduate Student Tsuyoshi Takeishi,
Department of Neuroscience, Section of Integrative Physiology,
Faculty of Medicine, Graduate School of Medicine, University of Miyazaki

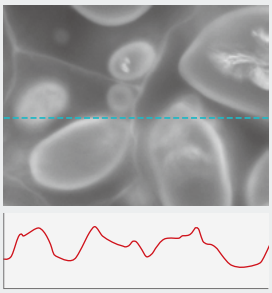
Sectioning Algorithm

High-Precision Optical Sectioning Using White Light

The electronic projection element enables a high-speed structured illumination scan. When compared to the effects of lasers, the white light source minimizes damage to the specimen. The use of white light also provides the ability to image over a wide wavelength range, delivering high-precision optically sectioned images.

Normal image

Thick specimens cannot be captured with conventional widefield microscopes due to scattered light in the Z plane. This fluorescence blurring obscures true signals in the focal plane of interest.

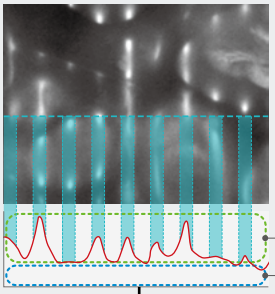


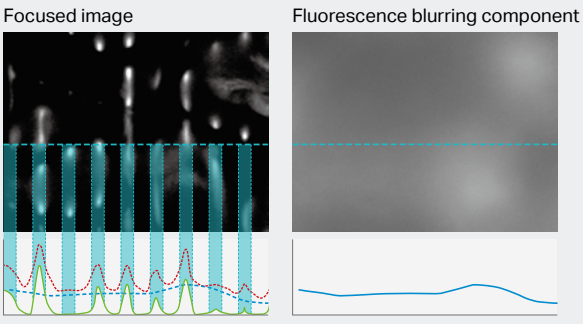
Brightness graph

BZ-X sectioning

STEP1 Pattern projection

The light passes through the electronic projection element and a structured pattern is projected onto the desired focal plane. Only signals within this focal plane are illuminated by the excitation light.



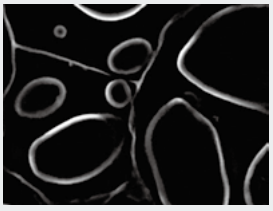


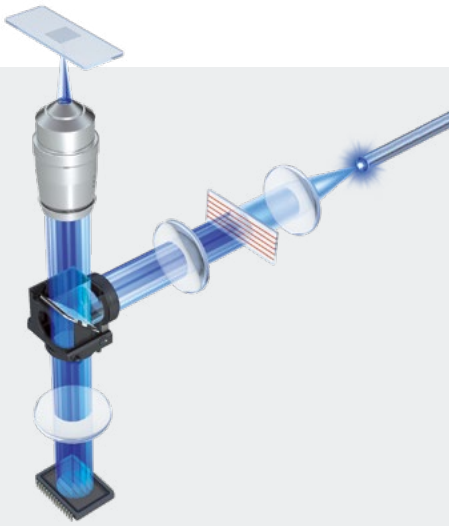
STEP2 Scan and capture

Multiple images are captured while the illumination pattern scans across the sample. Since the brightness of scattered signals does not change significantly as the pattern moves, the fluorescence blurring can be extracted and eliminated.

STEP3 Sectioning image

The fluorescence blurring is eliminated from the multiple images captured. These images are then automatically combined to produce a clear optical section.





Benefits of Optical Sectioning

Electronic projection element

The electronic component provides a more rapid, flexible excitation light configuration than a mechanical slit.

POINT 1

Optimal pattern automatically determined based on magnification.

POINT 2

Sectioning is optimized with a single click. No complex configuration or special skills needed.

POINT 3

Pattern width and structure can be easily changed. A 2D pinhole pattern can be used for higher resolution capture.

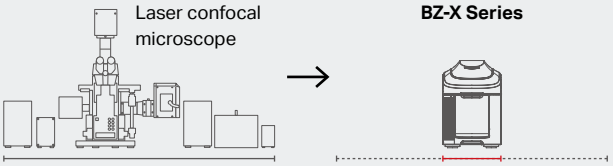
1D slit (×40) | 1D slit (×20) | 2D pinhole (×20)

White light source

Easy for any user to capture high-resolution images, without damaging lasers.

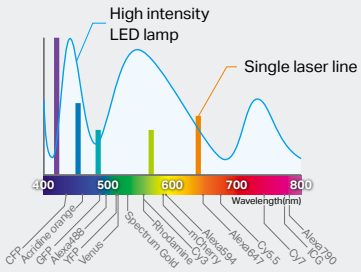
POINT 1

Simple, compact setup.



POINT 2

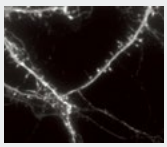
Simply change the filter to image any wavelength from UV to IR instead of dedicated laser lines.



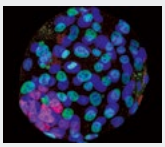
POINT 3

High-sensitivity detection using a monochrome CMOS reduces sample damage and photobleaching.

Spine (×100)



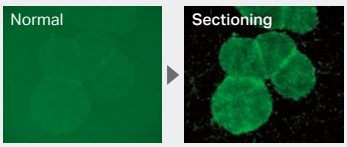
Mouse embryo



POINT 4

Capture images in any container, including plastic-bottom multi-well plates. No complex configuration required.

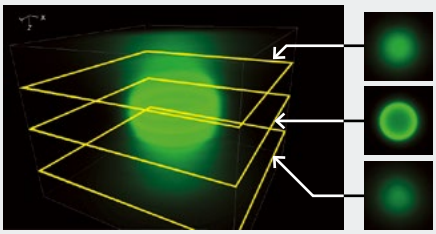
T-iPS cells in plastic dish



Courtesy of Assistant Professor Kyoko Masuda, Hiroshi Kawamoto Laboratory, Institute for Frontier Medical Sciences, Kyoto University

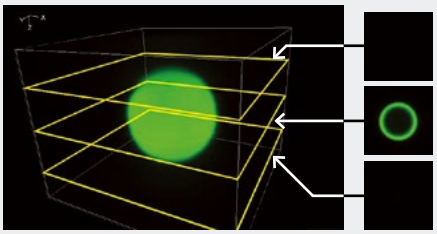
More Accurate 3D Analysis Using Sectioning

Fluorescent bead, 3D image
Normal observation



Fluorescence blurring is eliminated, and signals from the desired focal plane are captured.

Sectioning observation



Time-lapse

Temperature and CO_2 Regulation for Live-Cell Imaging

Perform time-series capture of brightfield, fluorescence, and phase contrast images at user-specified intervals. The temperature and CO_2 regulation chamber can hold a variety of vessels, including well plates, to create an ideal environment for specimens during prolonged time-lapse imaging.

Supports the installation of a stage-top compact incubator. Control temperature, CO_2 concentration, and humidity to perform extended imaging of live cells and cultured tissue.

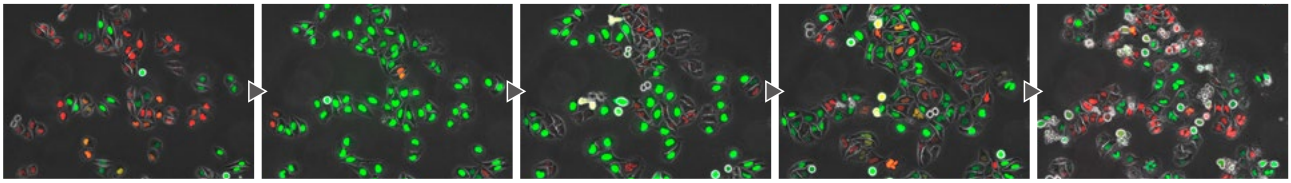
Use the touch panel to easily adjust temperature and CO_2 concentration.

Time-series Brightness Measurement Function

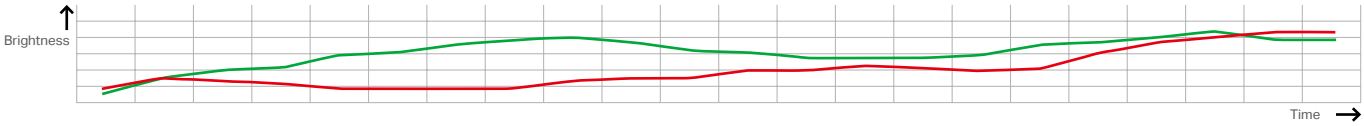
Quantify Changes Over Time

This can provide time-series measurement of changes in RGB brightness in time-lapse images, allowing for quantitative evaluations along the time axis for experiments such as changes in gene expression. The high-intensity LED light source experiences little fluctuation in light intensity over time, enabling accurate quantitative measurement even during extended time-lapse processes.

FUCCI cell cycle checkpoints



Courtesy of Lecturer Atsushi Kaida, Oral Radiation Oncology Department, Tokyo Medical and Dental University

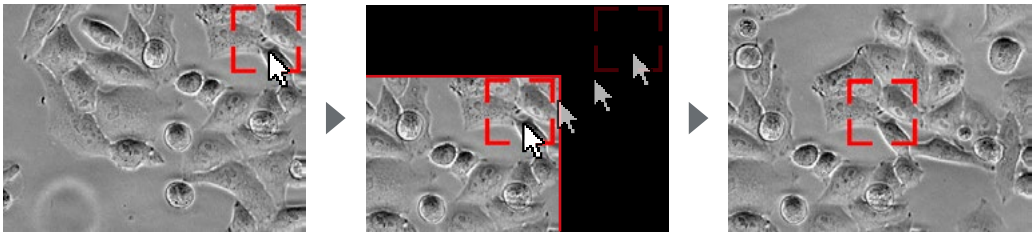


View time-lapse application videos ▶

Position Adjustment During Time Lapse

Adjust the field of view during time lapse capture

Adjust the capture position in the X, Y, and Z directions during time lapse in response to morphology changes and temperature drift. The function is performed using previously captured images, so sensitive samples are spared from additional light exposure.



The target is about to move out of the viewing area

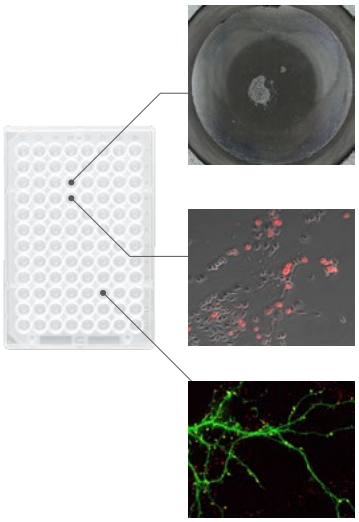
Readjust the X, Y, and Z capture position

Image capture resumes using the updated position

BZ-H5XT Time-Lapse Module × BZ-H5XJ Stitching and Multi-Point Imaging Module, BZ-H5XZ Z-Stacking Module

Coordinate-specific condition settings

Different capture conditions such as focal plane, exposure time, lens magnification, filters, and Z-stack width/step size can be set individually for each registered point. Multiple samples with different conditions can be imaged in the same time-lapse experiment for increased efficiency.



For colony counting

Lens	Phase contrast 10×
Observation mode	Phase contrast image
Image stitching	7×9 images
Z-stack	N/A
Exposure time	1/70 s

For transfection efficiency

Lens	Phase contrast 20×
Observation mode	Phase contrast + fluorescence overlay
Z-stack	1.5 µ pitch, 8 images
Exposure time	Phase contrast 1/50 s, fluorescence 1/5 s

For cultured nerve cells

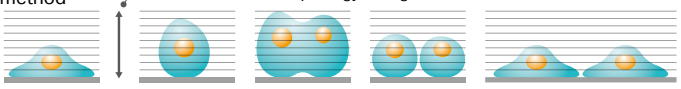
Lens	Oil immersion 60×
Observation mode	Fluorescence 2 ch overlay
Z-stack	0.5 µ pitch, 10 images
Exposure time	CH1 1/6 s CH2 1/12 s

Focus tracking function

The optimal focal plane is automatically selected from Z-stack data. This plane is then set as the center of Z-stack for the next capture to ensure that the sample continues to be in focus. This decreases the number of images captured at each interval, which not only reduces capture time and file size, but also reduces the risk of photobleaching.

Conventional method

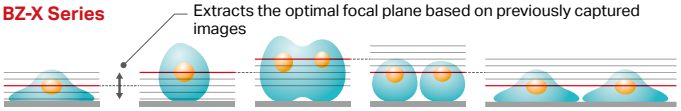
Sets a larger imaging range than necessary to allow for possible movement and morphology changes



- Larger Z-stack means more images captured
- More exposure to excitation light increases risk of photobleaching

BZ-X Series

Extracts the optimal focal plane based on previously captured images

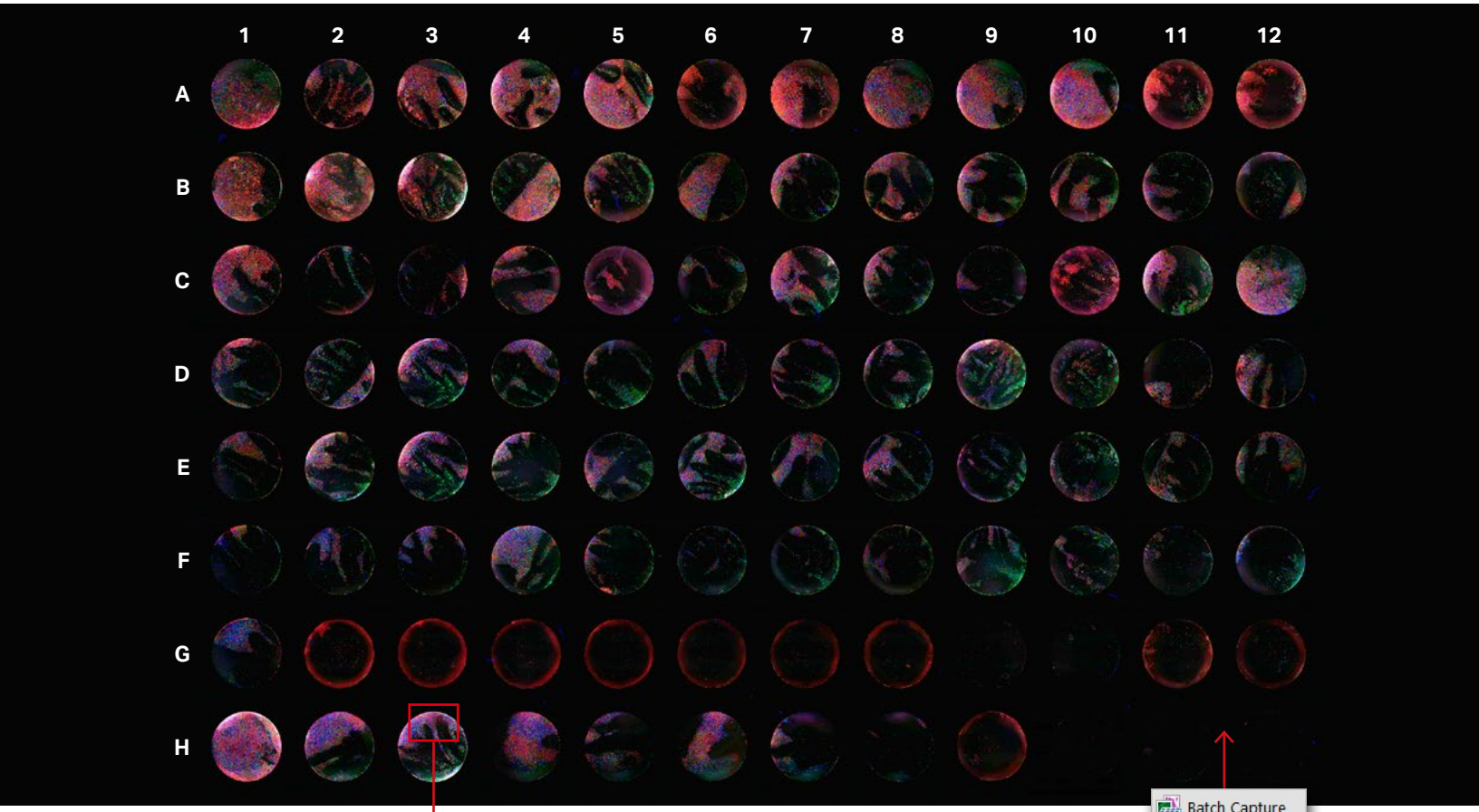


- Less images captured for more efficient review and analysis
- Minimizes sample's exposure to excitation light and reduces risk of photobleaching

Image Cytometer Module

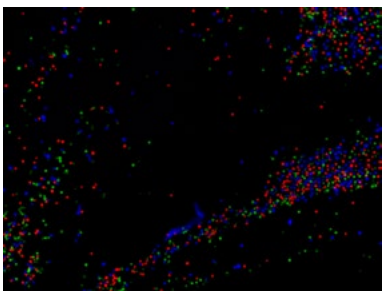
High Throughput for Capture and Analysis

Capture settings in one location can instantly be applied to all fields of view on a well plate. Users can select any or all wells to be scanned with uniform conditions for high reproducibility of data. This work flow can be completed in just three simple steps. The system will then automatically execute the capture without any additional user configuration.



STEP 1

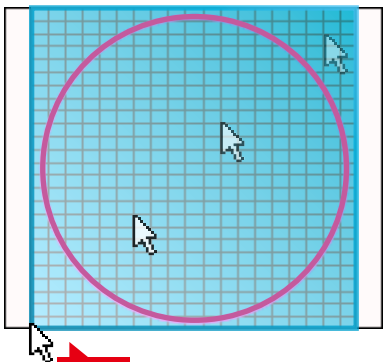
Set capture conditions



Lens magnification | Exposure time
Channel | Camera settings
Z-stack | Sectioning
etc.

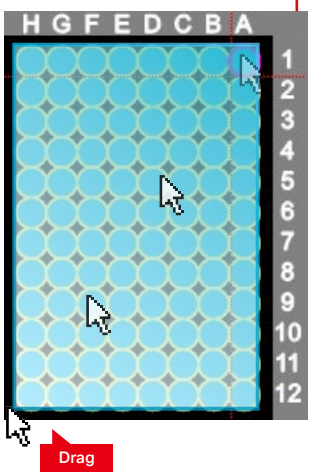
STEP 2

Click and drag to specify the range of capture within a well



STEP 3

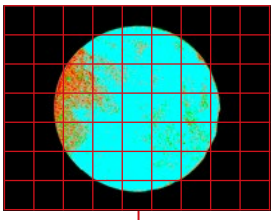
Click and drag to specify wells to capture



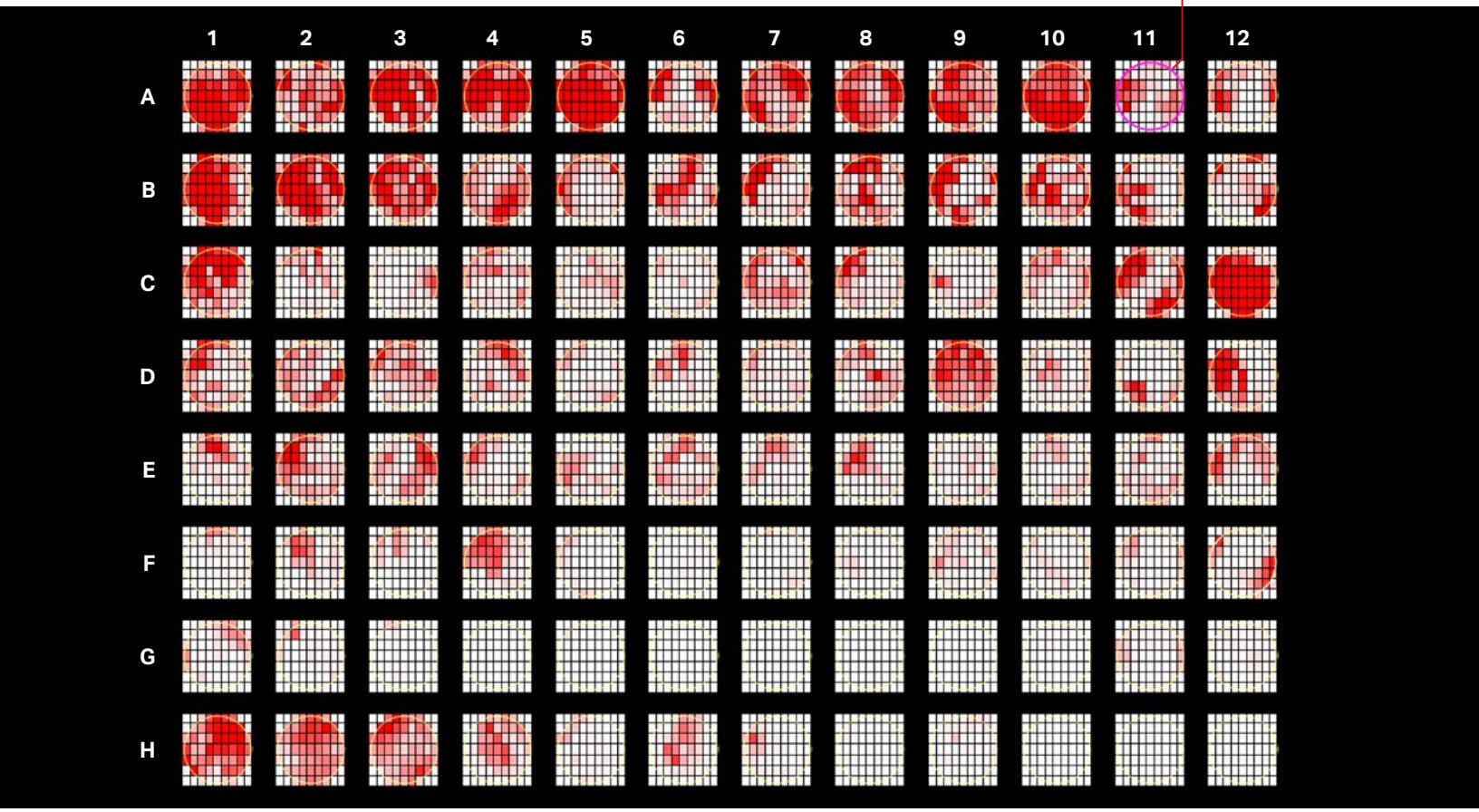
See the image cytometer in action ▶

Image Cytometer Analysis

Accurate, High-Content Analysis with High-Resolution Images



Set analysis conditions for a single image and apply to all data points automatically. This saves time and reduces variability from one image to the next. The BZ-X Series's advanced optics capture high-resolution images, resulting in highly precise data acquisition.



▲ **Heatmap function**

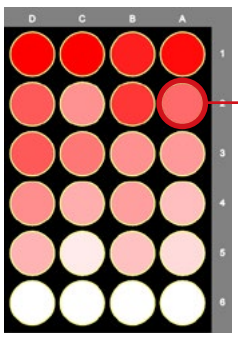
Gradated display visually represents different measurement values between fields of view and wells

Statistical analysis

This enables the creation of graphs for each measured item, such as sample counts, area, and light intensity. As well as graphs by well and by field of view, each field of view and measured value can be combined to create graphs covering the whole plate as a target.

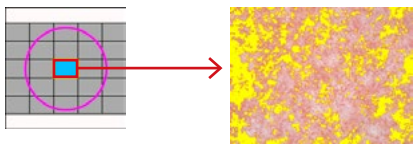
Stitched image of all wells

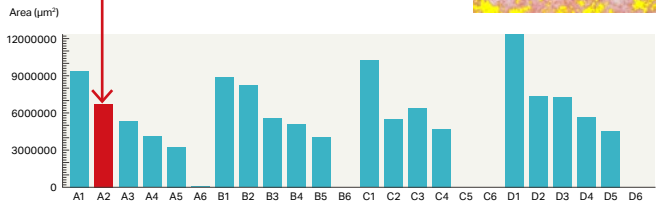
Heat map



Click any well to highlight the related data.

Easily check image data at any location in a well





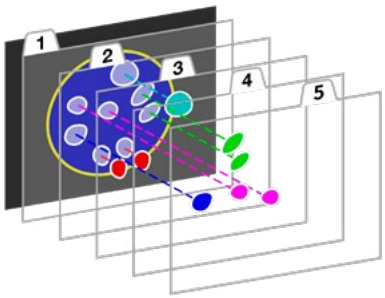
Hybrid Cell Count

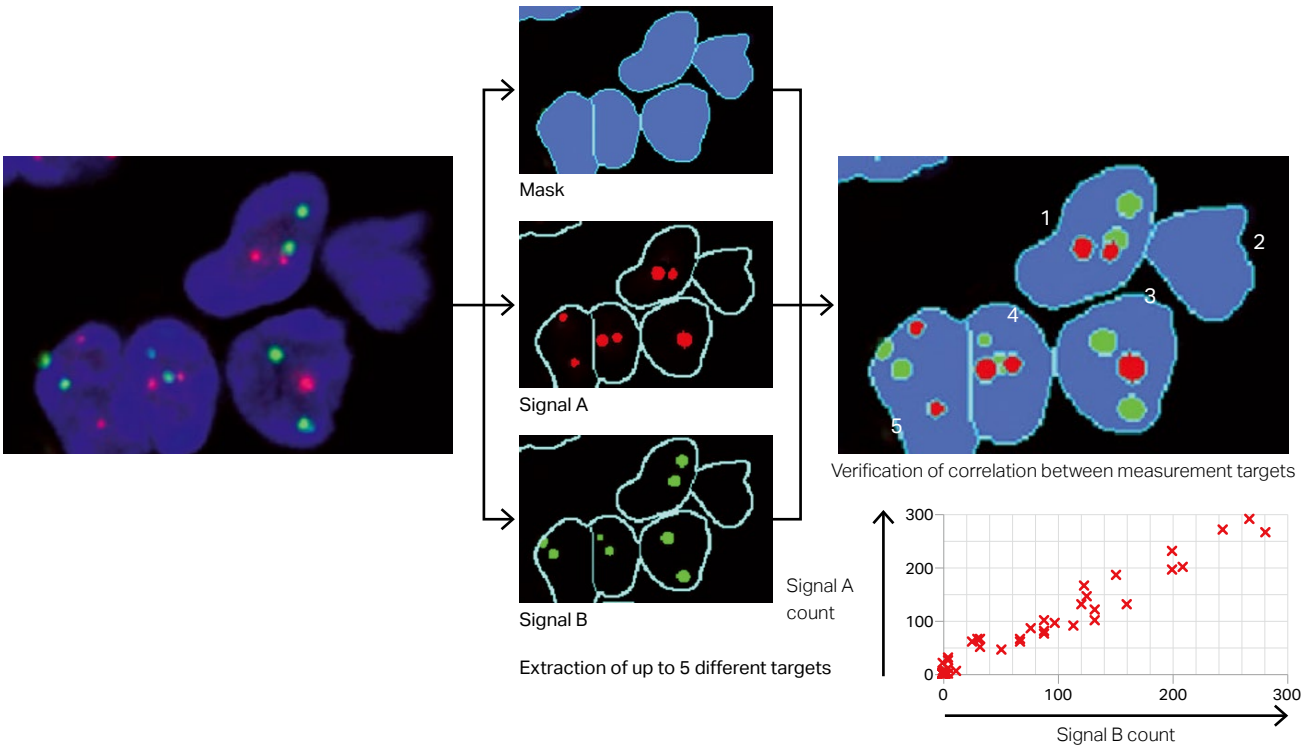
High Accuracy Quantification Across Various Specimens

KEYENCE's original algorithm provides accurate quantification even for phase contrast images of cultured cells. The area of interest can be extracted and quantified quickly and accurately from phase contrast, brightfield, and fluorescence images. This easy-to-use software produces repeatable, user-independent results.

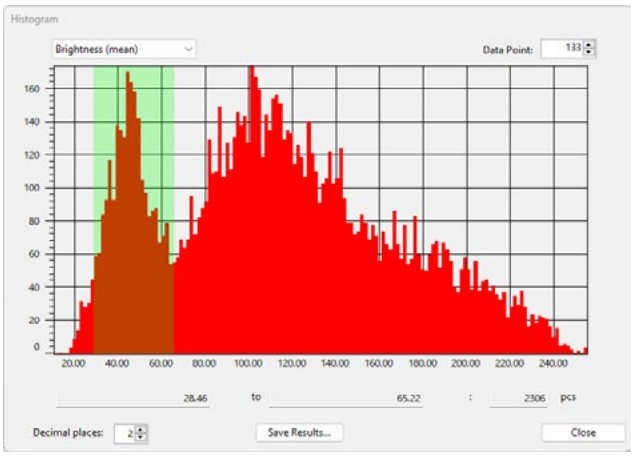
Mask extraction mode with up to 5 extraction targets

Specifying an extraction area as a mask and then specifying each measurement target in each masked area individually makes it possible to measure the number of targets and the area ratio in each masked area. This method is widely used for various applications, including measuring the area ratio of fibrotic regions in tissue and counting target genes visualized via fluorescence in situ hybridization (FISH) within individual nuclei. Up to five different kinds of measurement targets can be specified within a single nucleus.

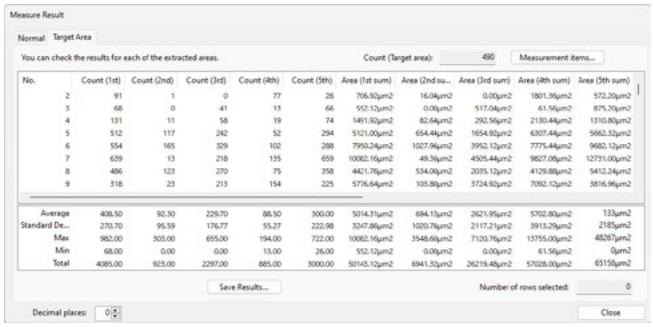




Data output in spreadsheet format



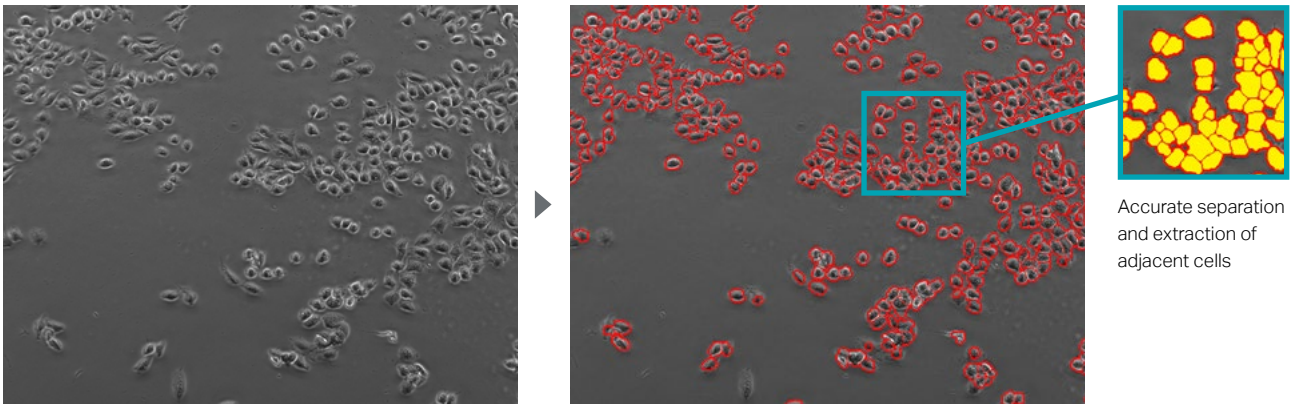
- Area
- Perimeter
- Major axis
- Minor axis
- Brightness (INT/MAX/MIN/AVE)
- RGB brightness (INT/MAX/MIN/AVE)
- Ferret diameter (X/Y)
- Count
- Area ratio, etc.



Take a look at our automated quantification software ▶

Phase contrast

With conventional software, it is difficult to automatically count cell images with low contrast between the measurement area and the background. Hybrid Cell Count uses an original algorithm that enables the outlines of cells to be extracted accurately.



Accurate separation and extraction of adjacent cells

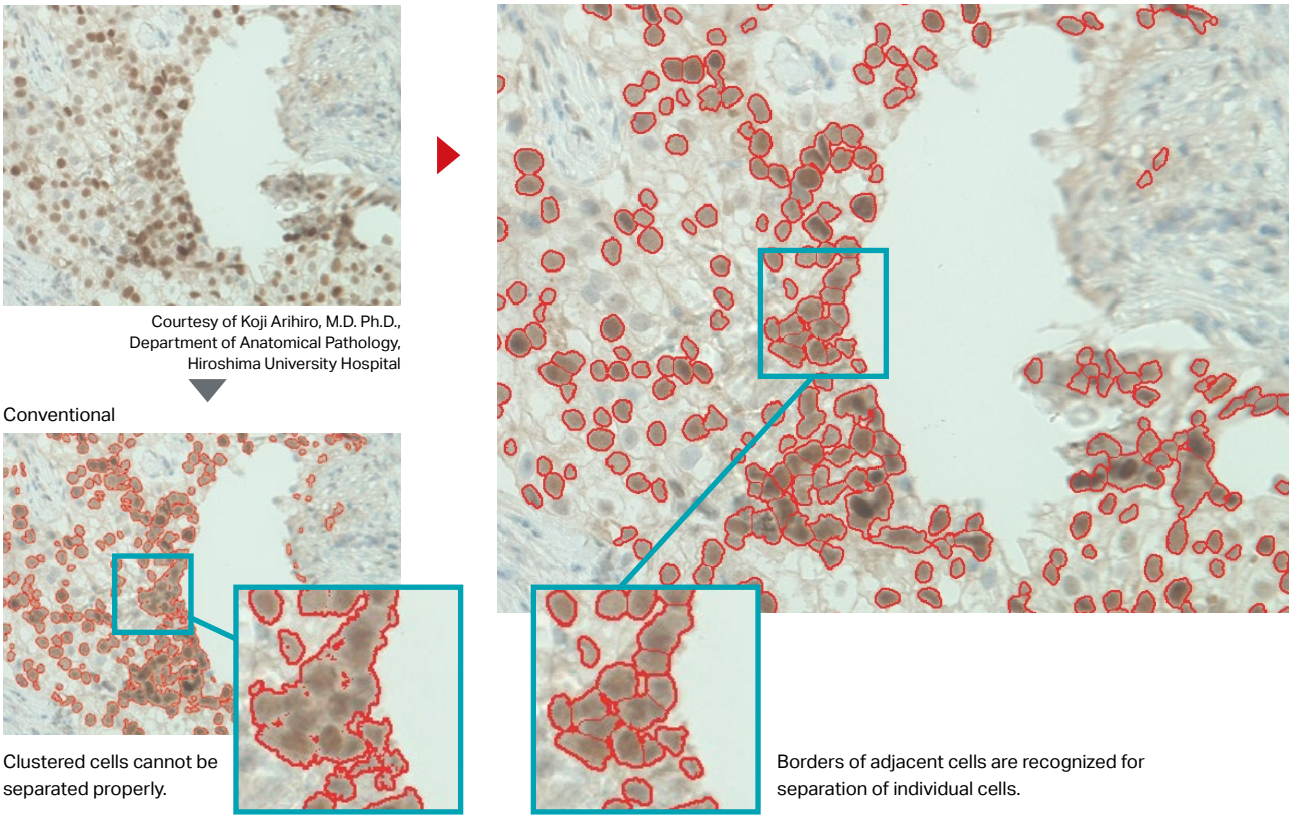
Cell counting with conventional software

Uneven background brightness prevents cells from being extracted properly.

Low contrast makes it impossible to accurately differentiate and count the cells.

Color extraction

Cells are extracted based upon hue differences and brightness information. Even clusters of cells can be separated and accurately quantified.



Courtesy of Koji Arihiro, M.D. Ph.D., Department of Anatomical Pathology, Hiroshima University Hospital

Conventional

Clustered cells cannot be separated properly.

BZ-X Series

Borders of adjacent cells are recognized for separation of individual cells.

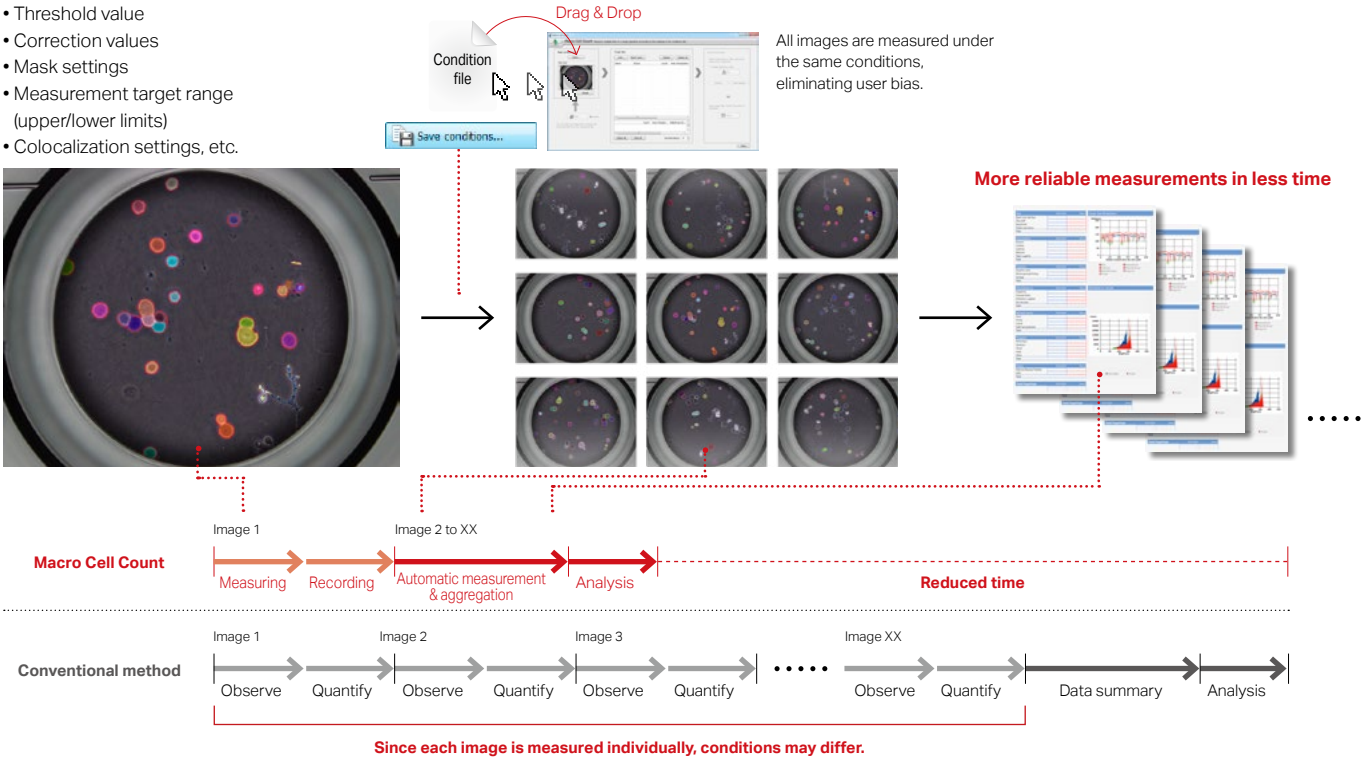
Macro Cell Count

Batch Processing for Repeatable Quantification

Once the appropriate measurement parameters are set for a single image, the same conditions can be applied to multiple images. This drastically reduces the amount of time needed for measurement, while improving data reliability by eliminating variations in measurement conditions.

Output conditions

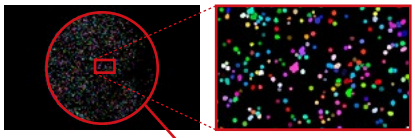
- Threshold value
- Correction values
- Mask settings
- Measurement target range (upper/lower limits)
- Colocalization settings, etc.



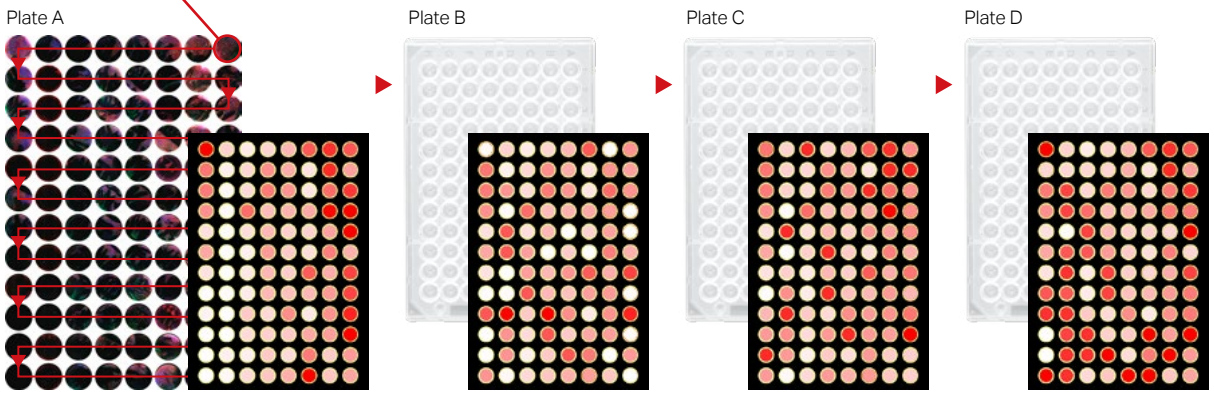
Batch Analysis of Multiple Plates

BZ-H5C × BZ-H5XJ × BZ-H5XI

High-Content Screening of Multi-Well Plates

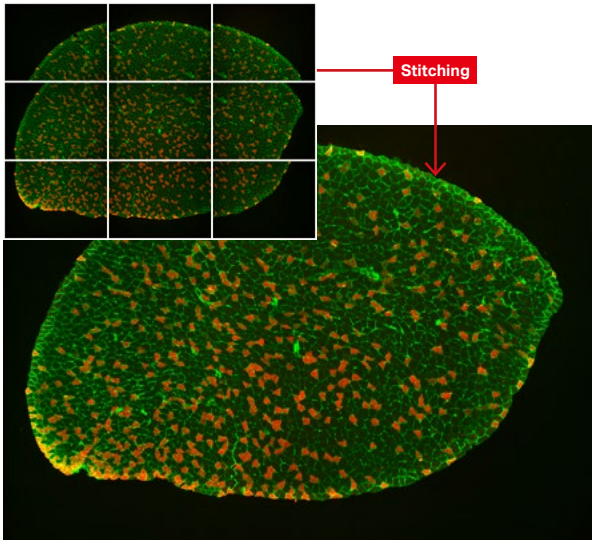


Automate batch processing of multiple well plates based upon specified measurement conditions.

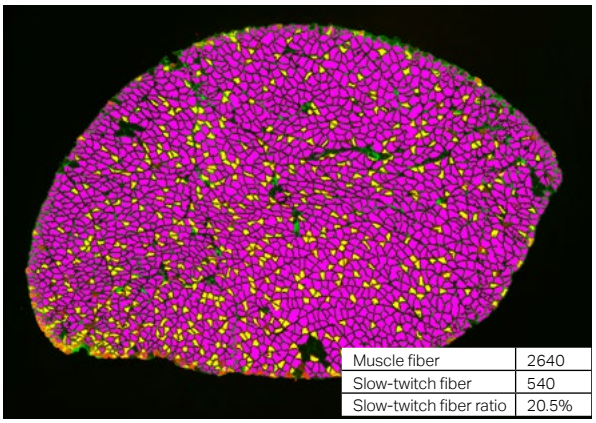


Hybrid & Macro Cell Count Application Examples

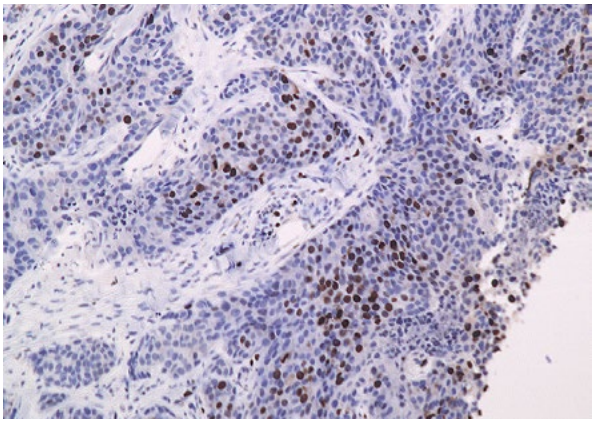
Slow-twitch skeletal muscle fiber ratio

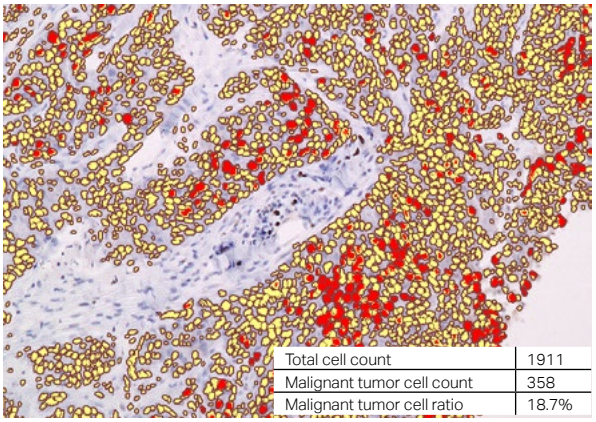


Courtesy of Lecturer Hideki Yamauchi, Division of Physical Fitness, Department of Rehabilitation Medicine, Jikei University

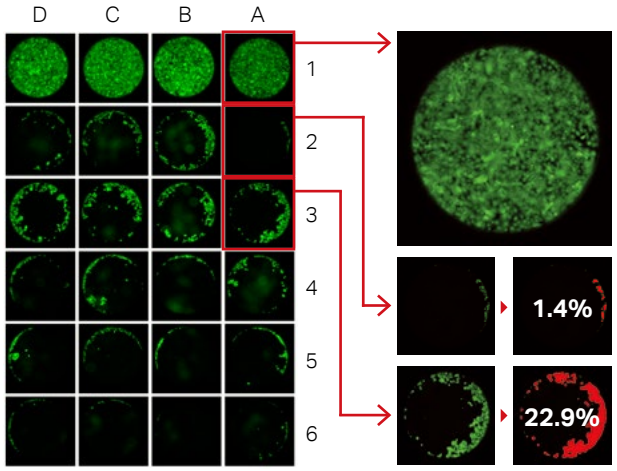


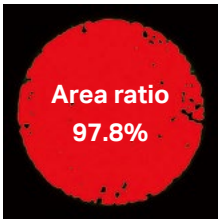
Malignant tumor cell (MIB-1) count

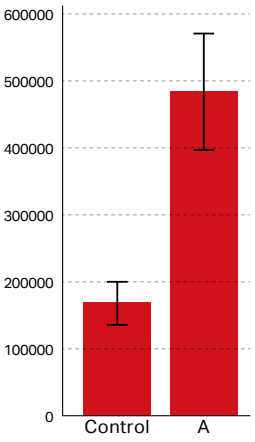




Cell migration assays using multi-well plates (24 wells)



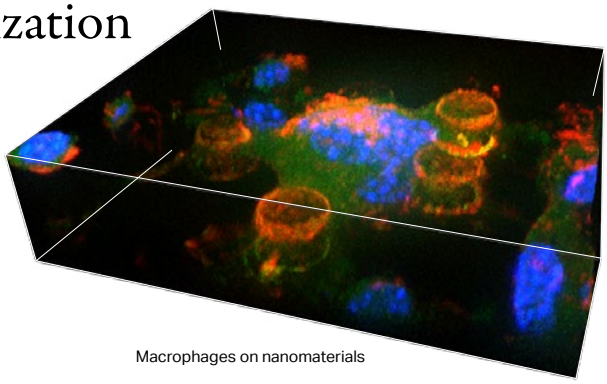




3D Analysis

Accurate Analysis of 3D Localization

Transform Z-stacks into 3D renderings with a single click to accurately observe three-dimensional structures. Use new 3D measurement functions to quantify features such as shape and localization. Results can then be saved in image or video format for convenient viewing.

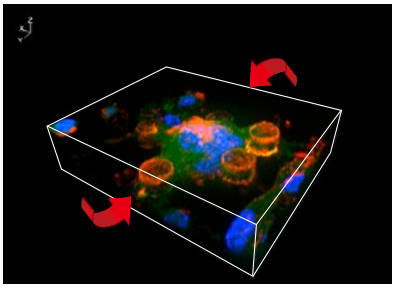


Macrophages on nanomaterials

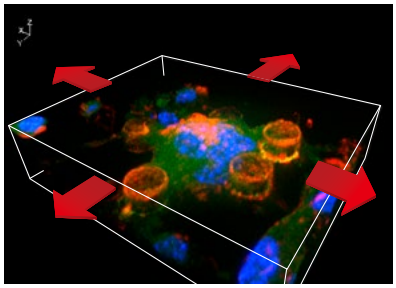
3D Display

Intuitive operation

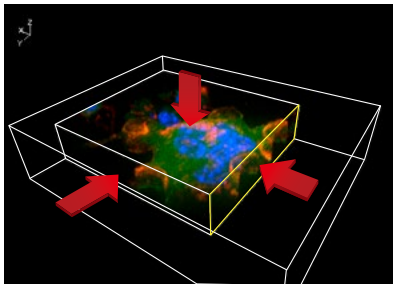
Rotation/ Click and drag to rotate



Zoom/ Use the mouse wheel to zoom in/out



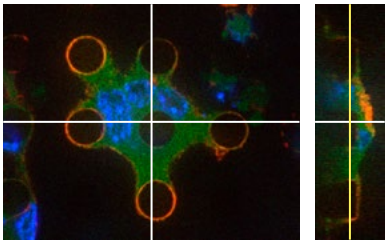
Sectional view/ Right-click to slice cross sections



Advanced 3D analysis

XY cross section

YZ cross section



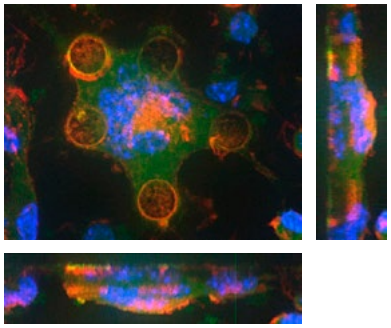
XZ cross section

XYZ slicing

An image can be sliced at any XYZ position to observe the cross-sectional view.

XY

YZ



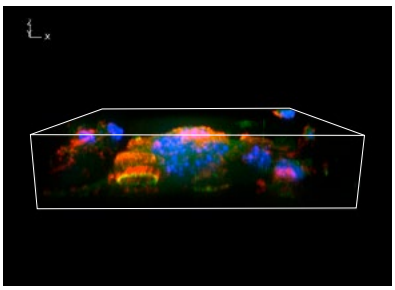
XZ

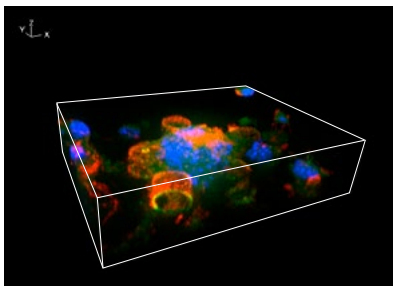
Maximum projection

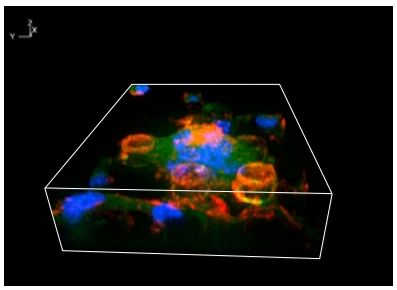
Pixels with the maximum brightness in the Z-axis are combined to display an image with a large depth-of-field.

Video creation

3D images can be saved and played back as a video. Since videos are saved in a standard format, they can be viewed in any standard software and embedded within presentations and other documents.

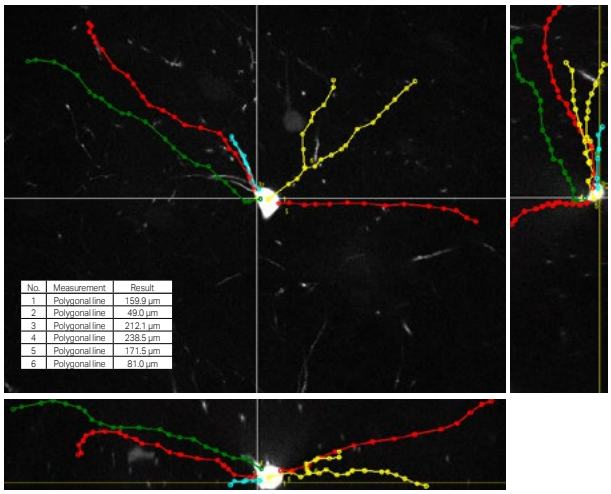






3D Measurement

Click a measurement point on a cross section and scroll through the Z-stack images to accurately measure even complex 3D shapes, such as axons of neurons. The count function enables simple and convenient counting of 3D localization for FISH studies.



Intuitive measurement menu

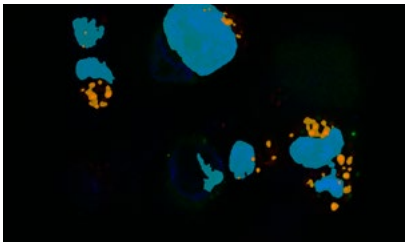
2 points | Count | Multi-point line | Area | Between ellipses

3D Cell Count

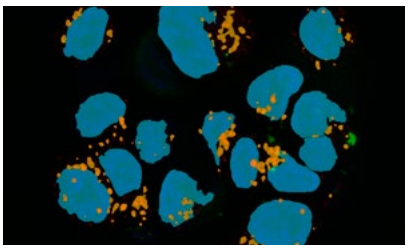
BZ-H5R × BZ-H5C

One-Step Three-Dimensional Quantification

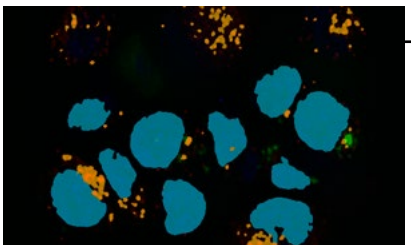
Z-Stack: Plane A



Z-Stack: Plane B

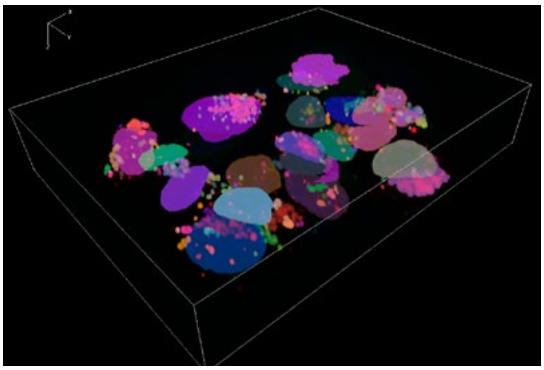


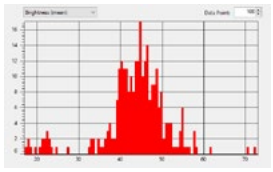
Z-Stack: Plane C



Instantly apply quantification conditions to an entire Z-stack. Quantify features such as volume, surface area, and intensity of extracted areas. Specified measurement conditions are applied to the Z-stack in real-time, allowing users to quickly view and optimize settings.

Measured areas that overlap on the Z axis are automatically integrated.



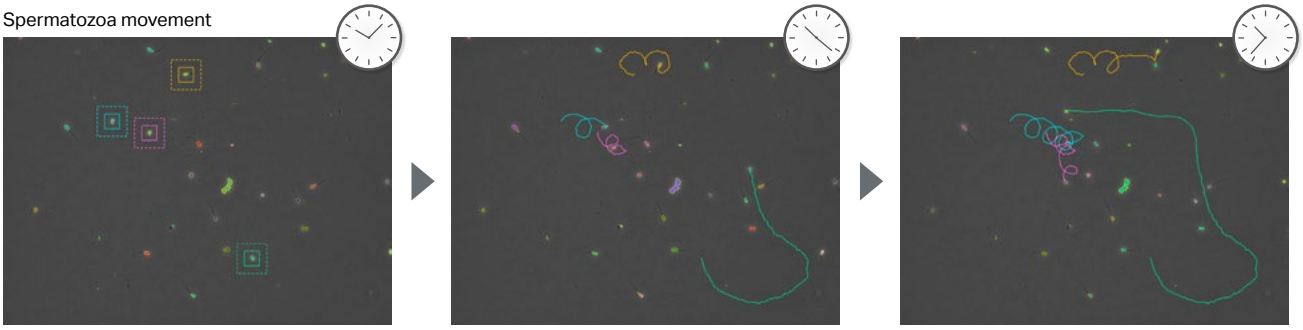


Motion Analysis

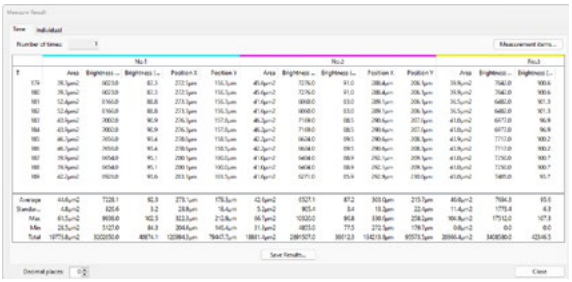
Track Movement Over Time

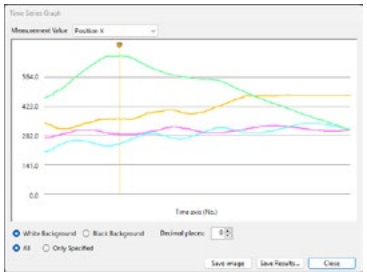
Select a target and track it using brightness, hue, and appearance information. Automatically record changes in coordinates to measure travel range, speed, and movement over time.

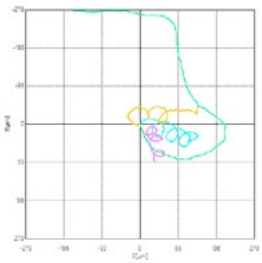
Spermatozoa movement



Time-series data output







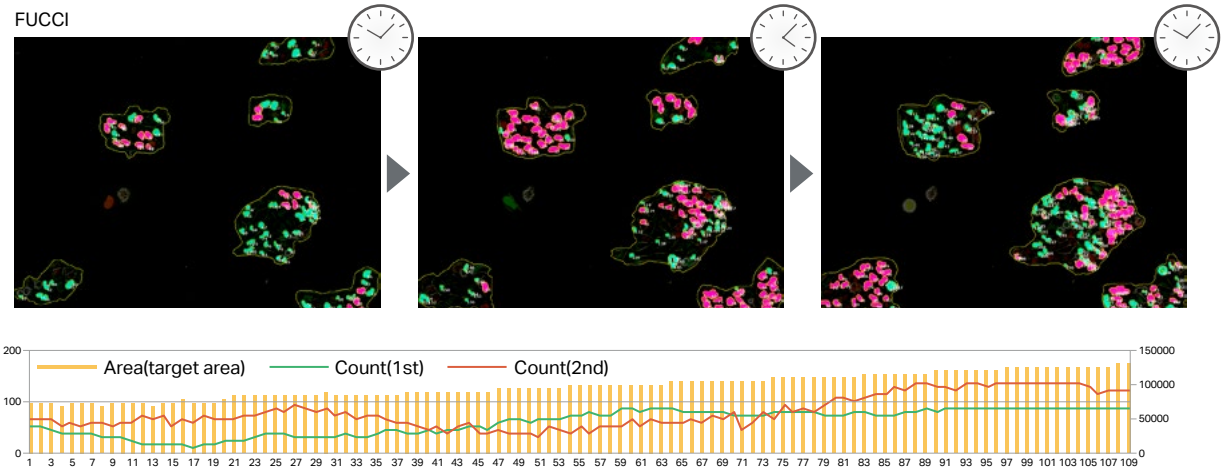
Time-series Cell Count

BZ-H5K × BZ-H5C

Quantify Specimen Changes Over Time

Perform batch processing of high-precision quantification for video and time-lapse recordings. Quantify cell counts, surface areas, and signal intensities of extracted targets, and visualize results with time-series graphs. The data can then be exported for more in-depth analysis, such as correlating surface area expansion with changes in signal intensity.

FUCCI

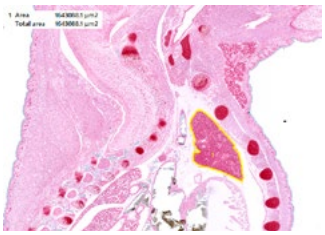


Measurement

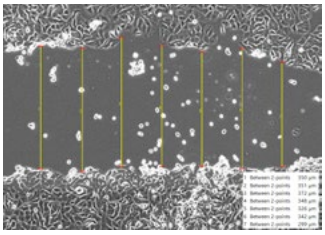
Perform Point-and-Click 2D Measurements

A variety of 2D measurements can be made directly on the image simply by clicking the desired end points. This enables easy and accurate measurement, such as quantifying the axon length of neurons. RGB brightness values can also be quantified and visually displayed on a histogram.

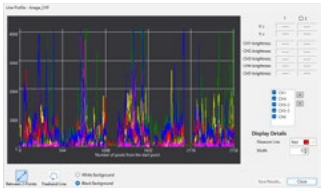
Area



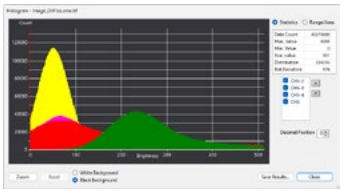
Distance

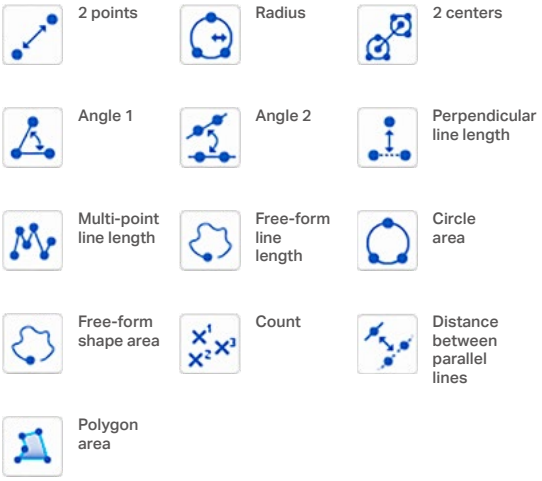


Line profile



Histogram

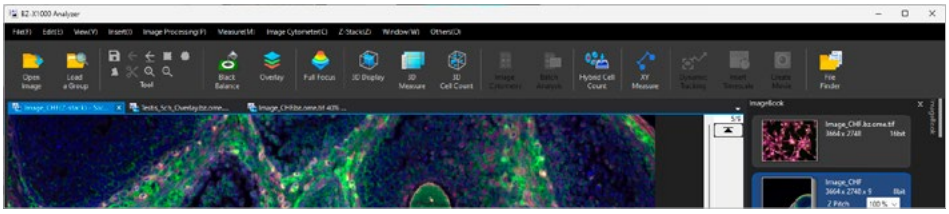




BZ-H5A BZ-X1000 Analyzer

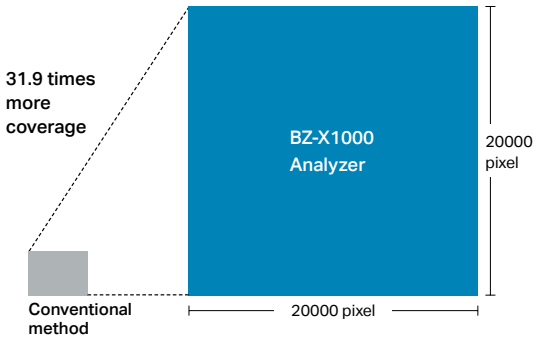
Advanced Analysis Software

Perform analysis in the easy-to-use BZ-X1000 Analyzer. Capture conditions are stored in image metadata for automatic processing of Z-stacks, time-lapse, image stitching, and quantification.



Reliable analysis of 20000 × 20000 pixel high-resolution images

The maximum size for analysis has been significantly increased to 20000 × 20000 pixels (400 million pixels).
This makes it possible to analyze high-resolution images captured with the 10-megapixel CMOS sensor directly without any reduction in quality. Stitched images—which had to be downscaled for analysis with conventional systems—can also be processed without sacrificing a wide field of view or high resolution.
This enables precise quantification even with detailed signals and area ratio measurements across entire whole-mount tissue sections.



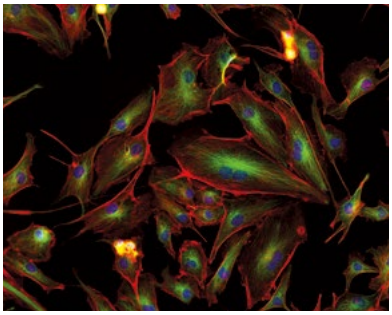
Objective Lenses for Fluorescence Microscope

Bright and Clear

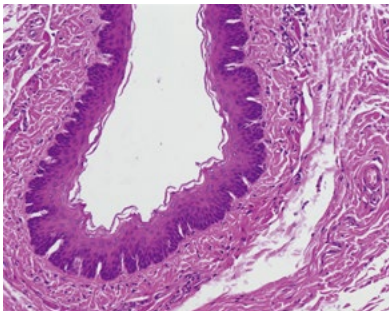
All-in-One Fluorescence Microscope Lenses

Bright and clear with a wide wavelength

The wide wavelength range from ultraviolet to near-infrared yields a high transmission ratio to clearly observe both fluorescence and brightfield images. Ideal for live cell imaging as bright fluorescence images can be obtained even with weak excitation light, minimizing damage to the cells.

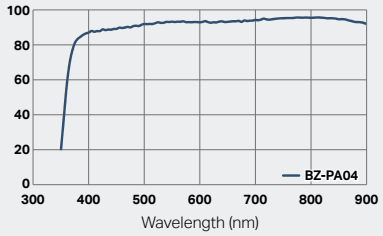


Skin cells inside the pulmonary artery of a cow



Esophagus

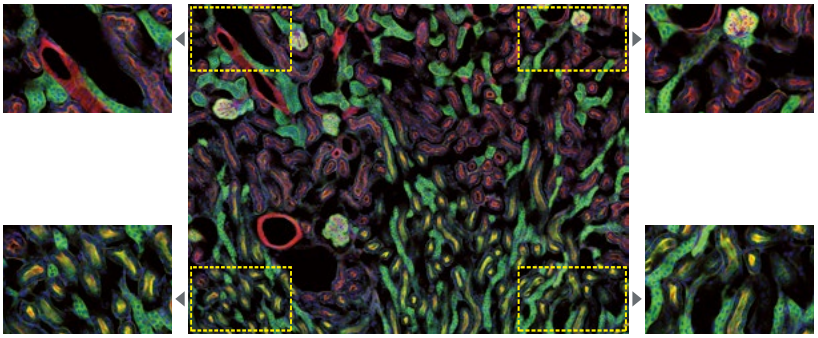
The wide wavelength range from ultraviolet to near-infrared yields a high transmission ratio.



With low phototoxicity due to minimal light diffusion and absorption by organic materials, the lenses have been greatly improved to handle the wavelength range of 650–900 nm, indispensable for deep observation and live-cell imaging.

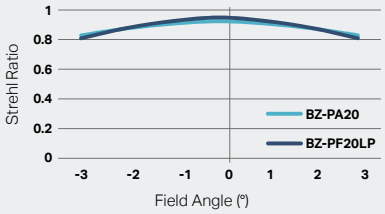
Precision optics for flawless, full-field imaging

Advanced correction of color and field curvature aberrations ensures exceptional image quality across all magnifications—from low to high—and throughout the UV to near-infrared spectrum. The system maintains superior flatness to the edges of the field of view, enabling seamless capture of vivid, multi-color stitched images.



Mouse kidney

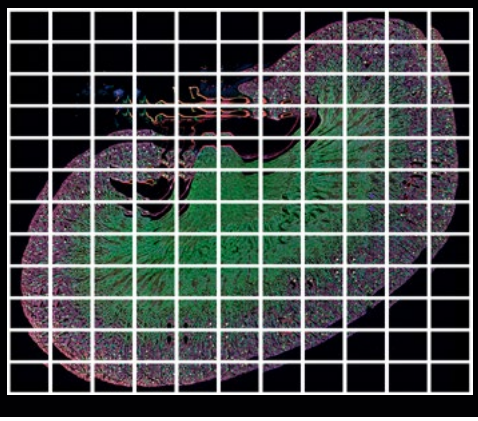
Achieves a high Strehl ratio from the center of the optical axis to the periphery

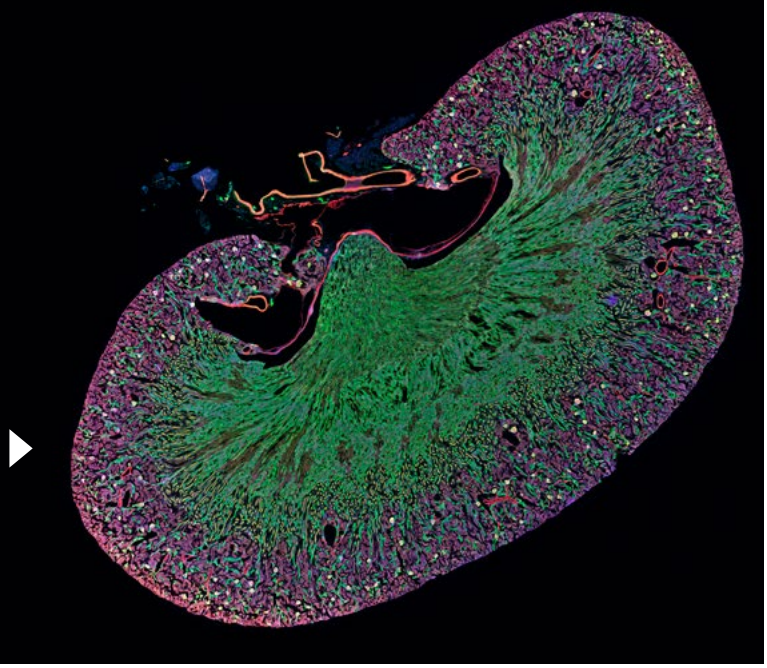


What is the Strehl ratio?
The Strehl ratio is the ratio of actual light intensity when compared to the maximum light intensity of the point source in an ideal optical system with absolutely no aberrations. It is generally preferable for objective lenses to have a ratio of 80% or higher.

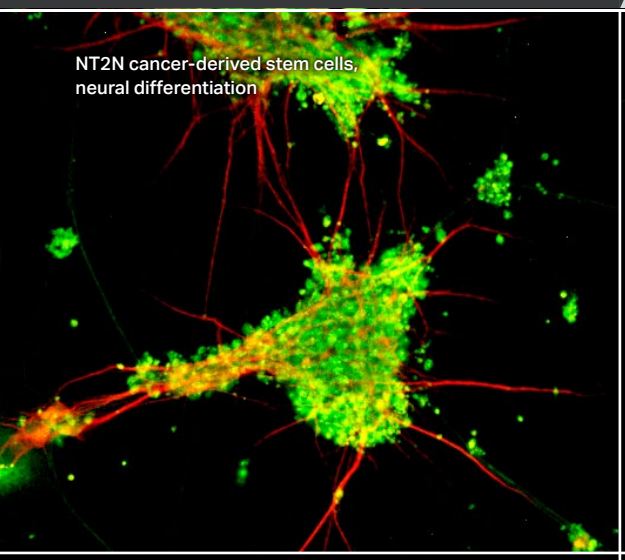
Fluorescence image of a mouse kidney
Multi-colored image stitching 11 × 12 = 132 images in total
Without shading adjustment
R: Alexa Fluor 568
G: Alexa Fluor 488
B: DAPI

Before stitching

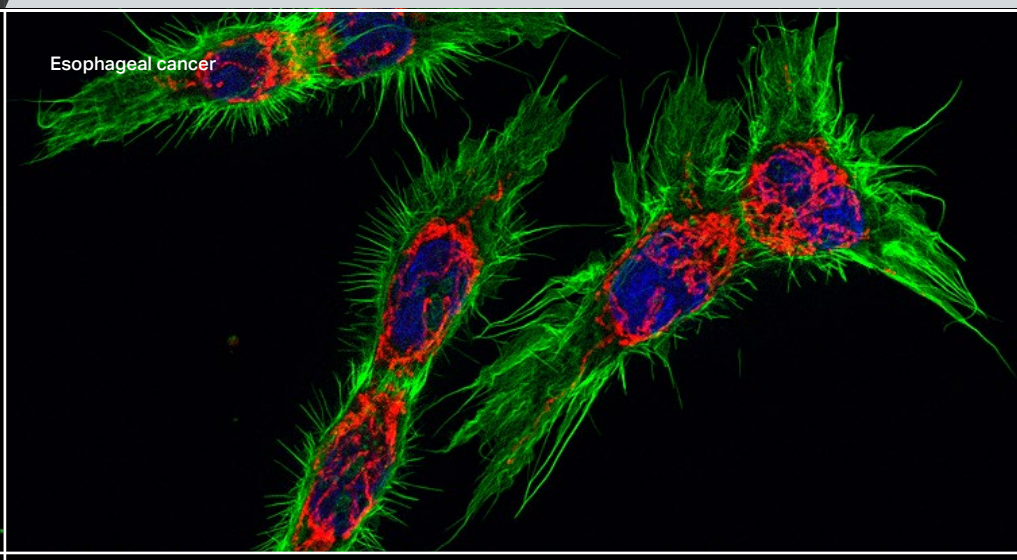




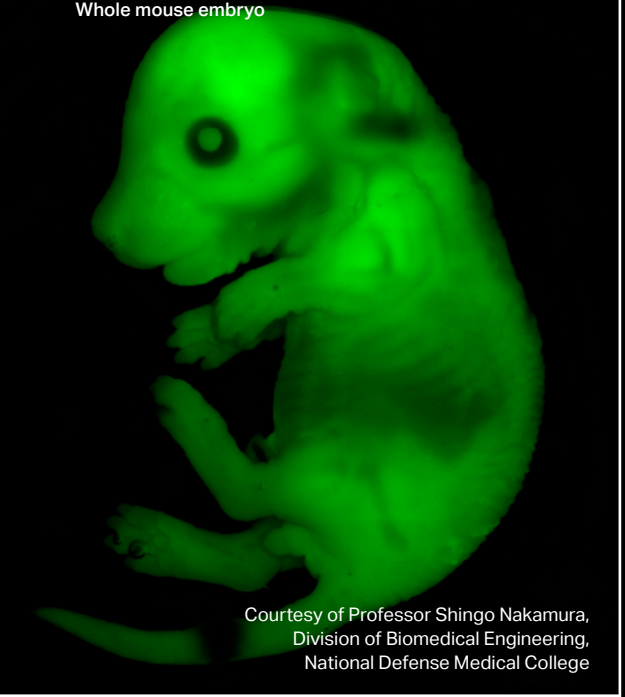
NT2N cancer-derived stem cells, neural differentiation



Esophageal cancer

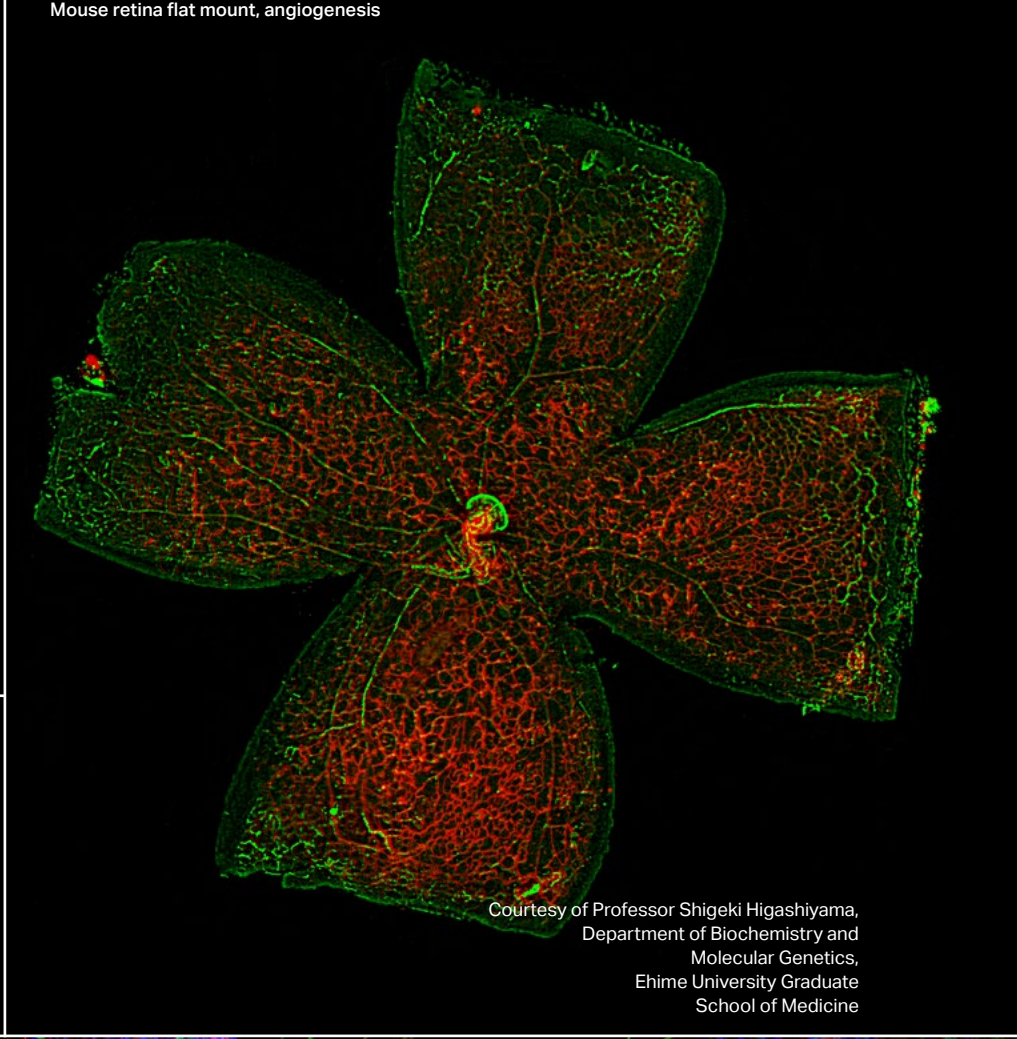


Whole mouse embryo



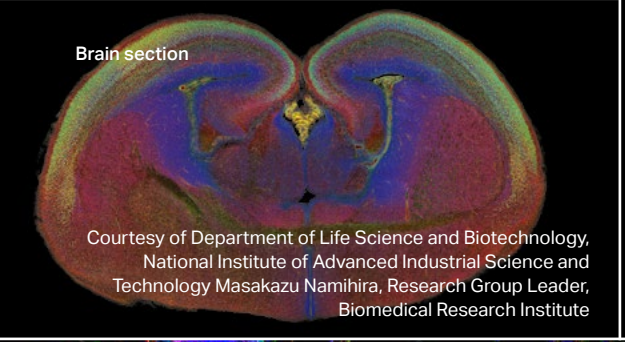
Courtesy of Professor Shingo Nakamura, Division of Biomedical Engineering, National Defense Medical College

Mouse retina flat mount, angiogenesis



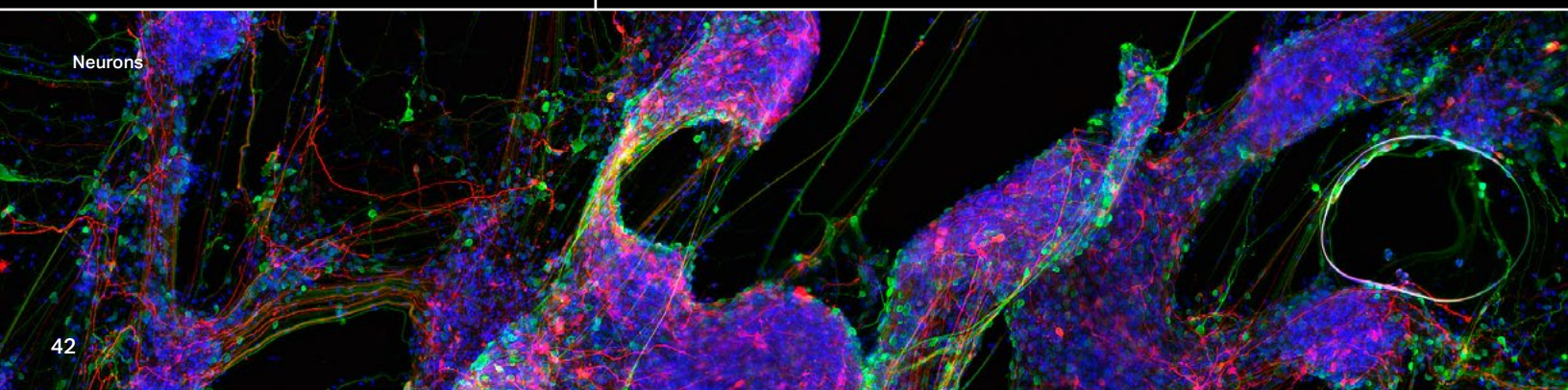
Courtesy of Professor Shigeki Higashiyama, Department of Biochemistry and Molecular Genetics, Ehime University Graduate School of Medicine

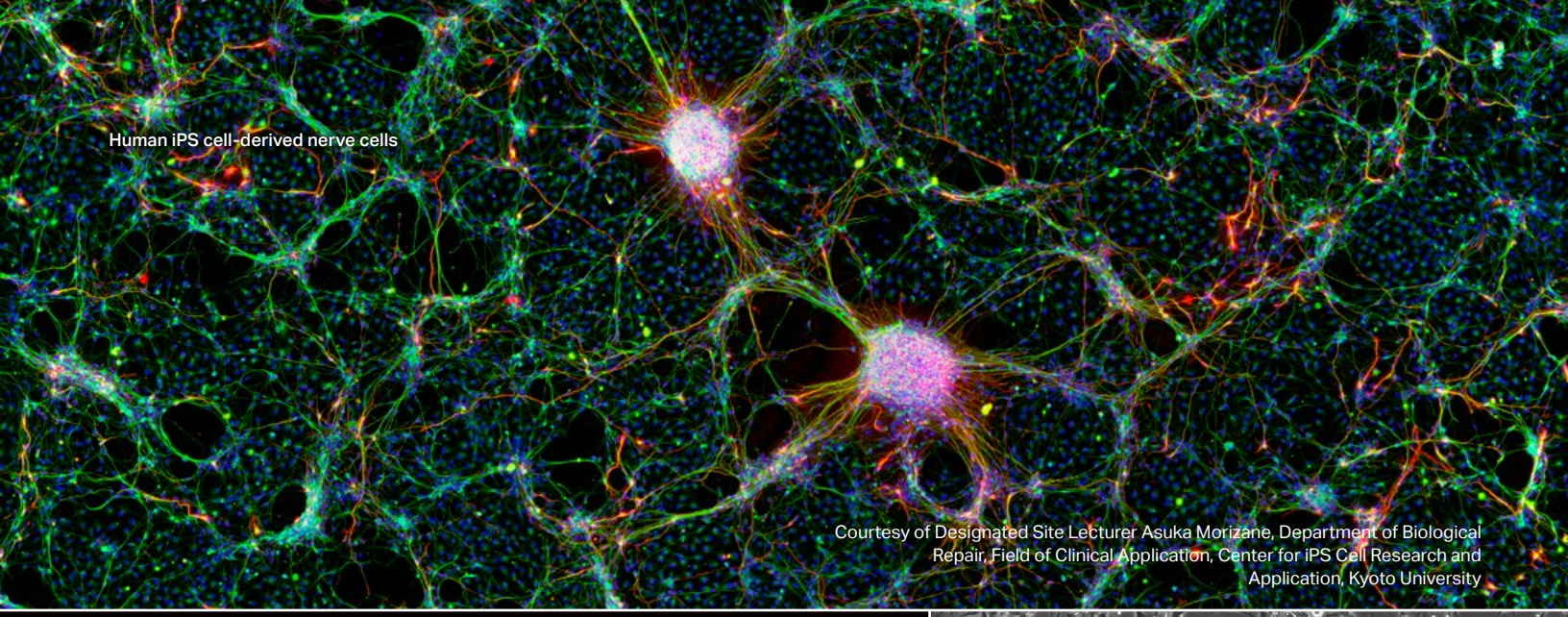
Brain section



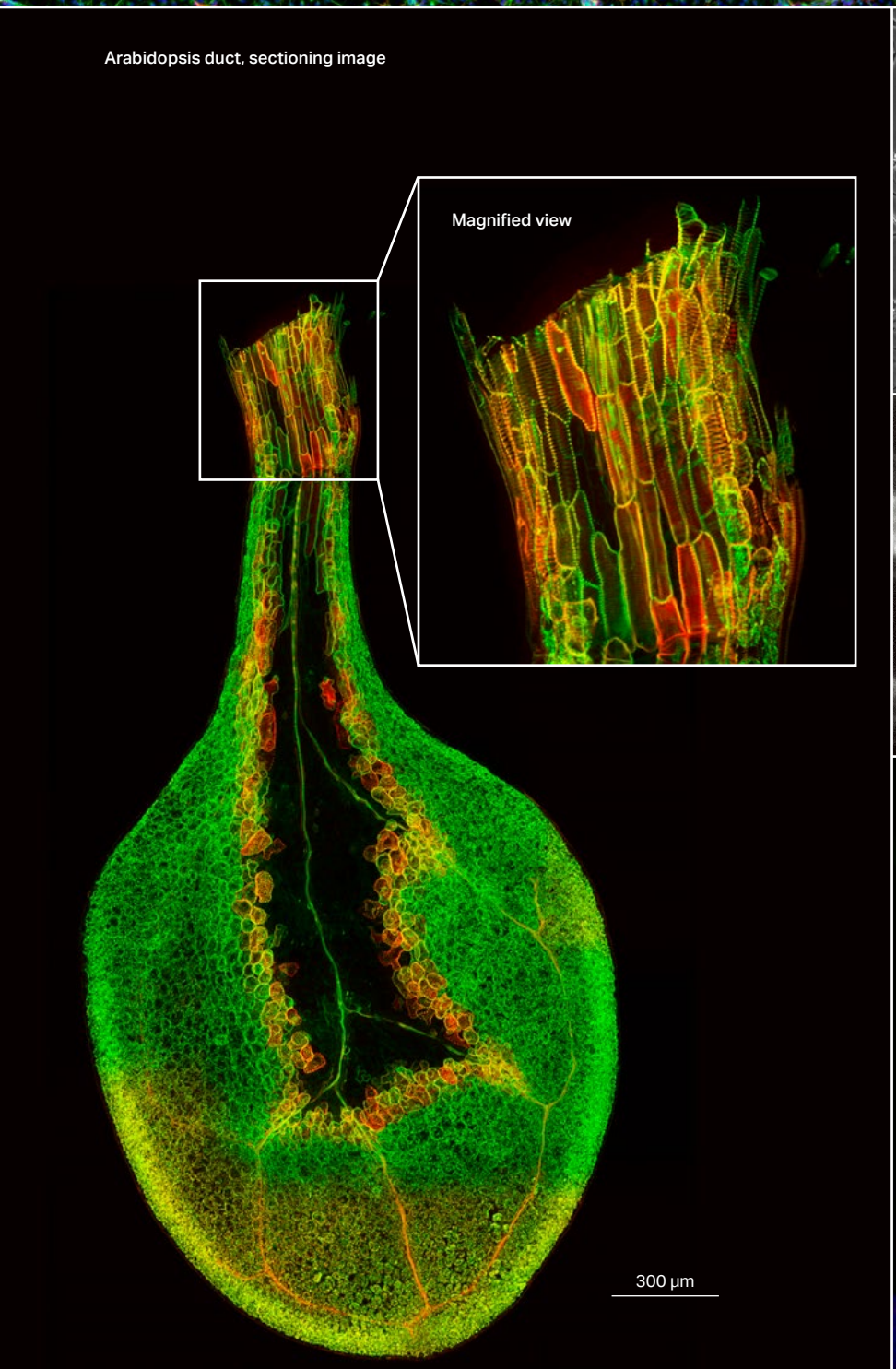
Courtesy of Department of Life Science and Biotechnology, National Institute of Advanced Industrial Science and Technology Masakazu Namihira, Research Group Leader, Biomedical Research Institute

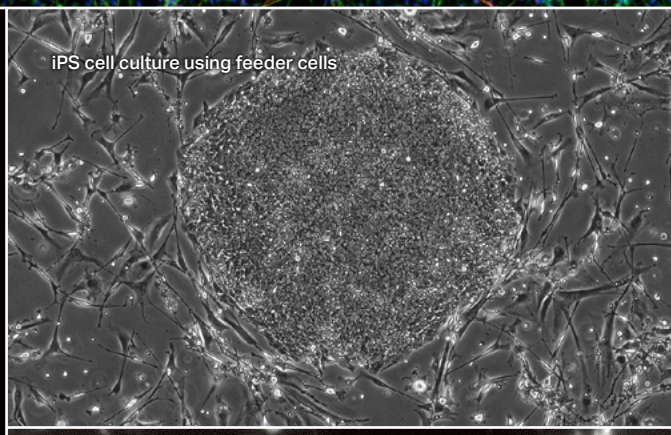
Neurons

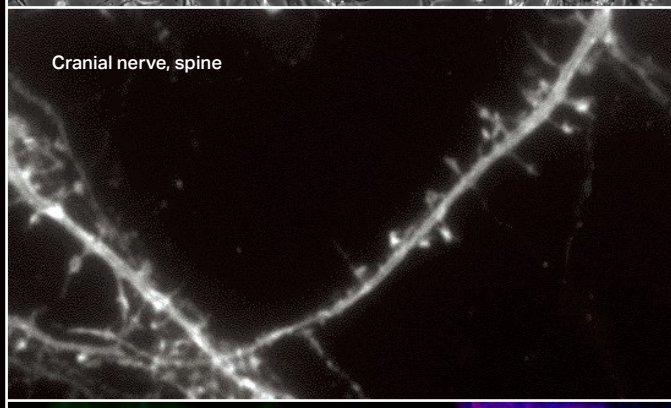




Courtesy of Designated Site Lecturer Asuka Morizane, Department of Biological Repair, Field of Clinical Application, Center for iPS Cell Research and Application, Kyoto University

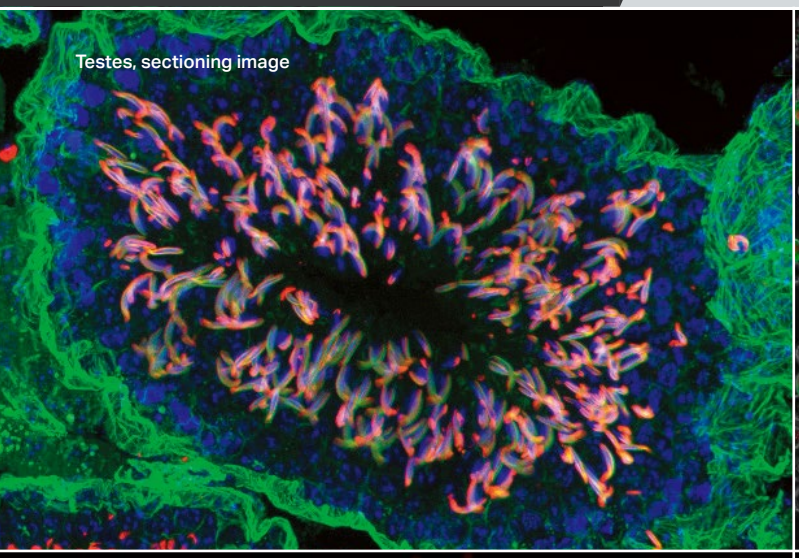




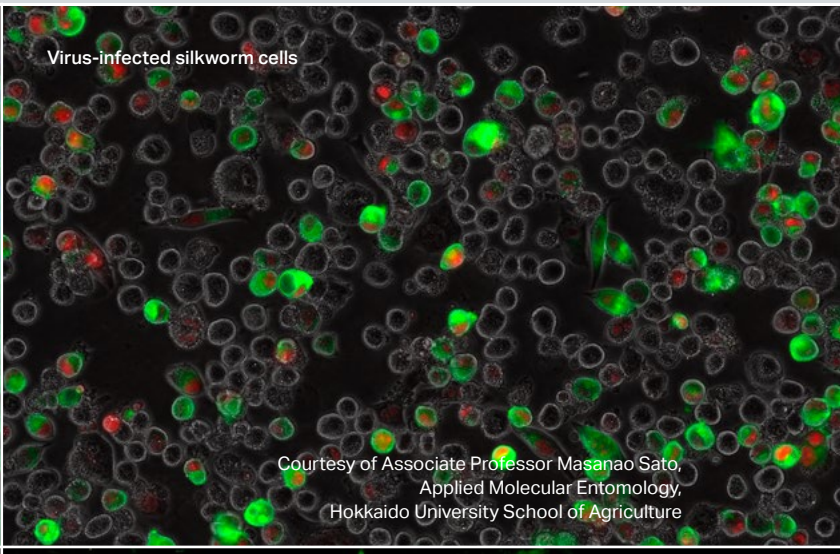


Courtesy of Designated Site Lecturer Yasuhiro Shiga, Laboratory of Environmental Molecular Biology, School of Life Sciences, Tokyo University of Pharmacy and Life Sciences

Testes, sectioning image

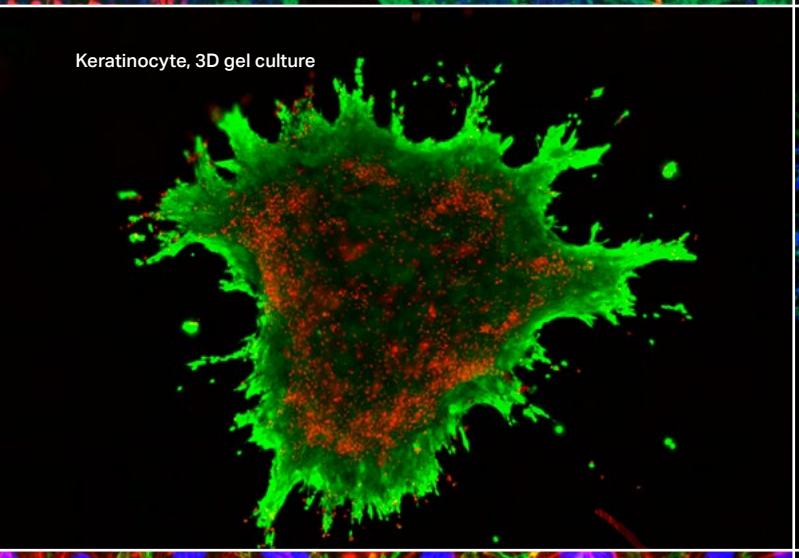


Virus-infected silkworm cells

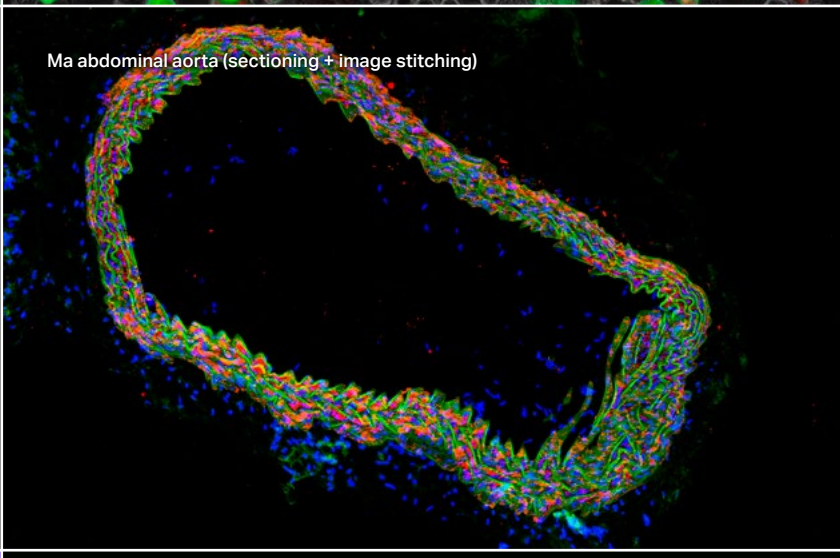


Courtesy of Associate Professor Masanao Sato,
Applied Molecular Entomology,
Hokkaido University School of Agriculture

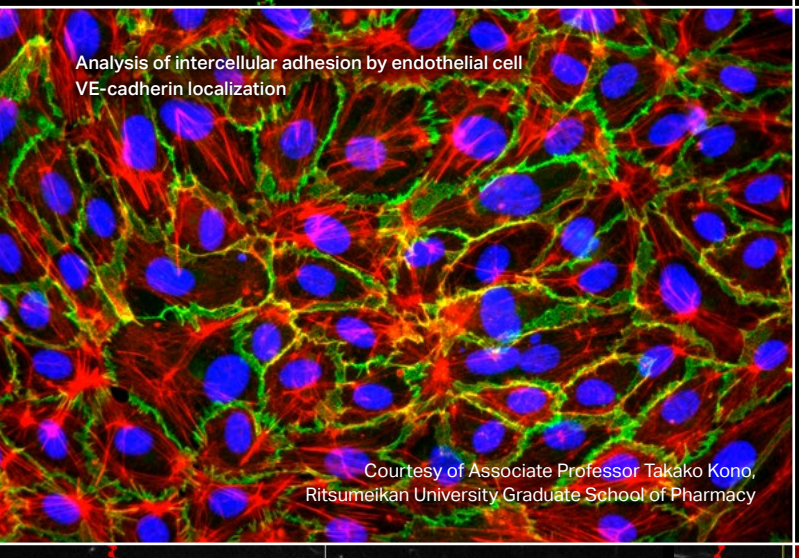
Keratinocyte, 3D gel culture



Ma abdominal aorta (sectioning + image stitching)



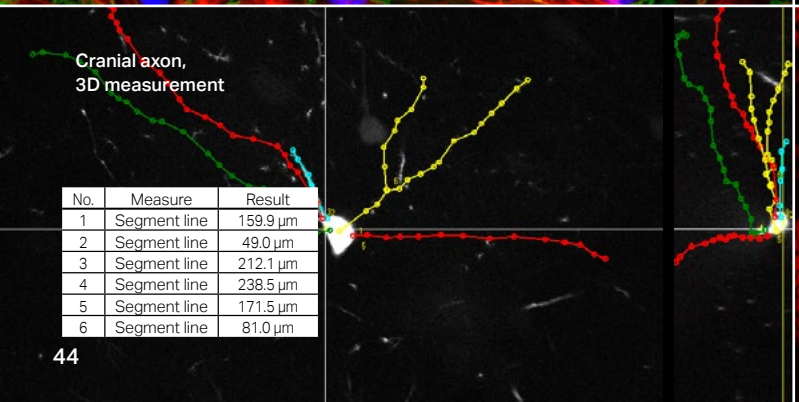
Analysis of intercellular adhesion by endothelial cell
VE-cadherin localization



Courtesy of Associate Professor Takako Kono,
Ritsumeikan University Graduate School of Pharmacy

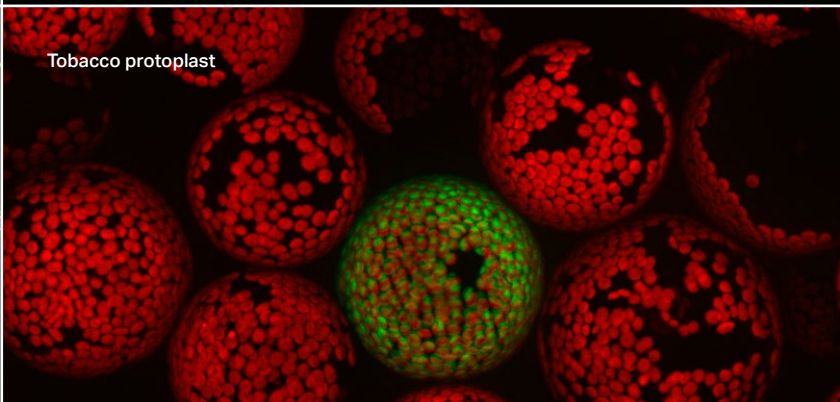
Drosophila brain, sectioning image

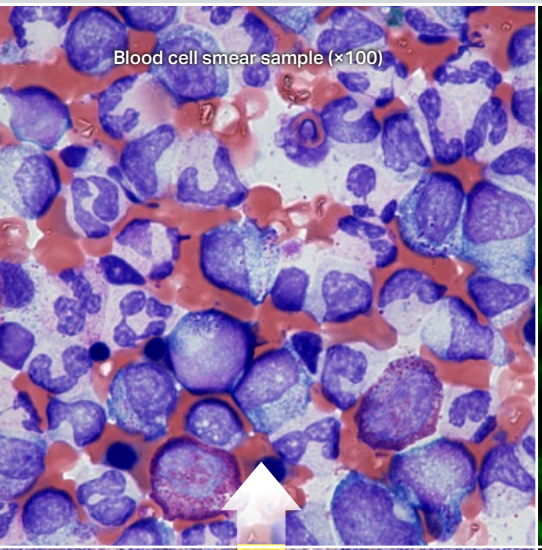
Cranial axon,
3D measurement

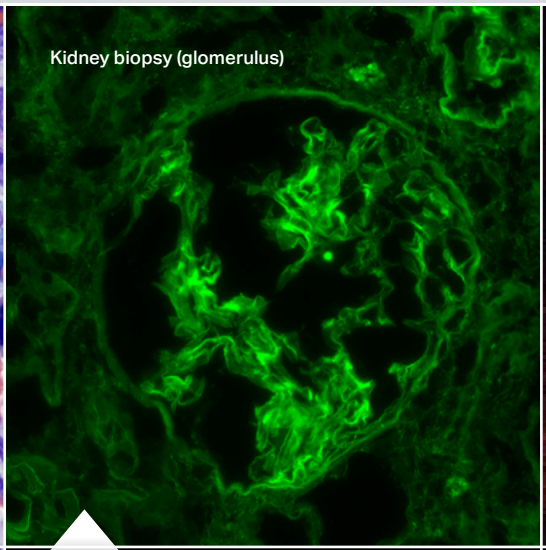


No.	Measure	Result
1	Segment line	159.9 µm
2	Segment line	49.0 µm
3	Segment line	212.1 µm
4	Segment line	238.5 µm
5	Segment line	171.5 µm
6	Segment line	81.0 µm

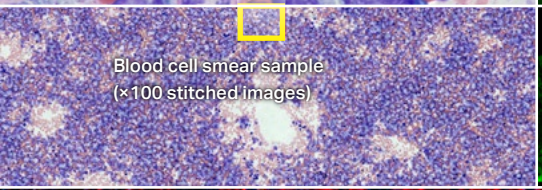
Tobacco protoplast

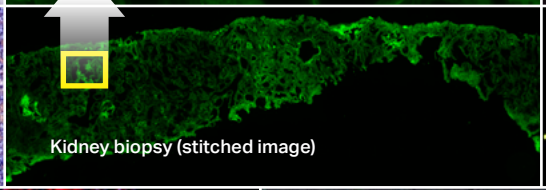


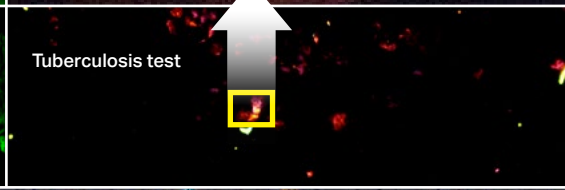

Blood cell smear sample (×100)

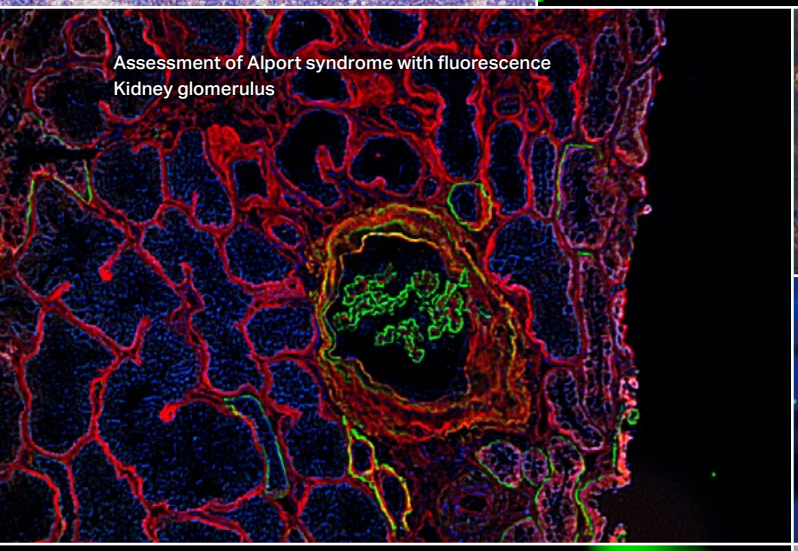

Kidney biopsy (glomerulus)

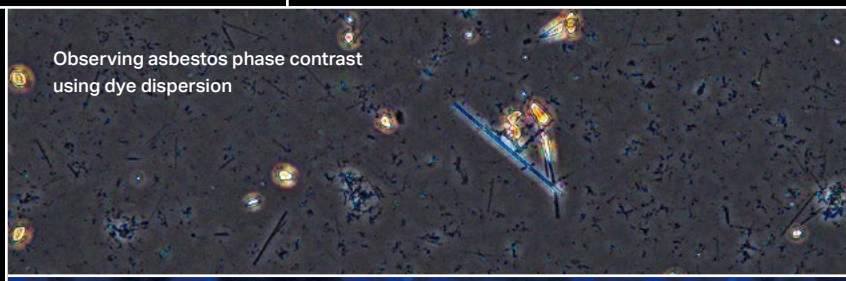

Tuberculosis test
(Antimycobacterium tuberculosis)

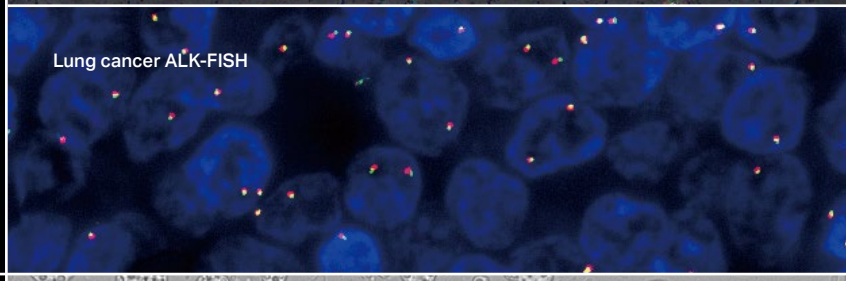

Blood cell smear sample
(×100 stitched images)

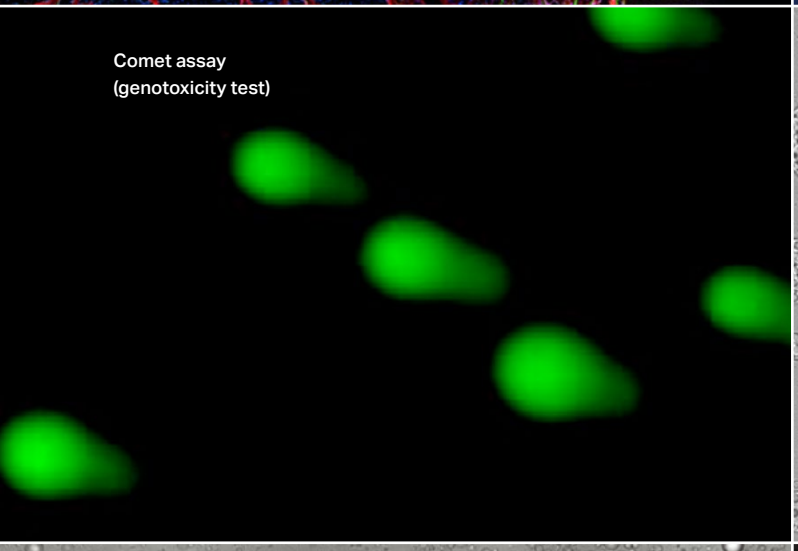

Kidney biopsy (stitched image)

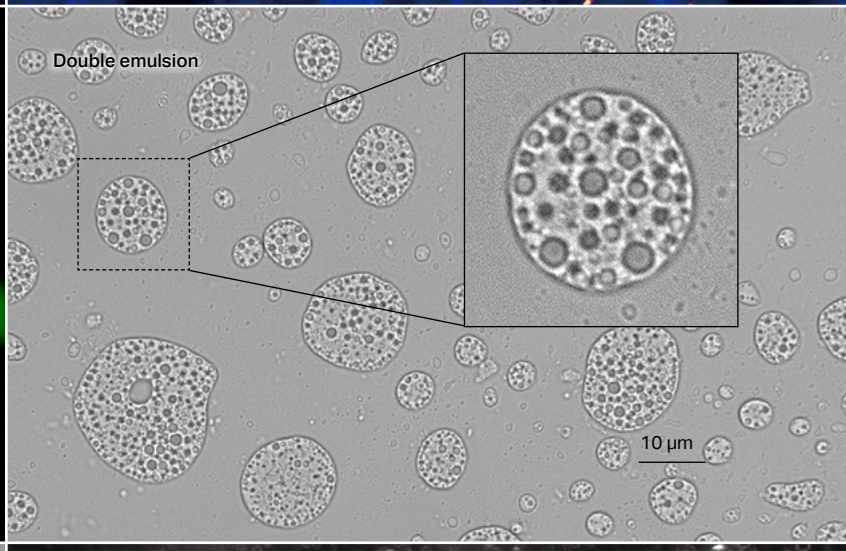

Tuberculosis test

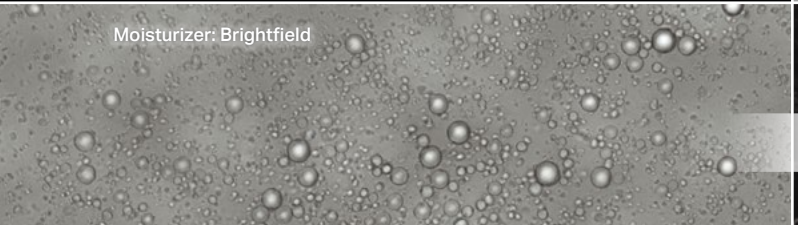

Assessment of Alport syndrome with fluorescence
Kidney glomerulus

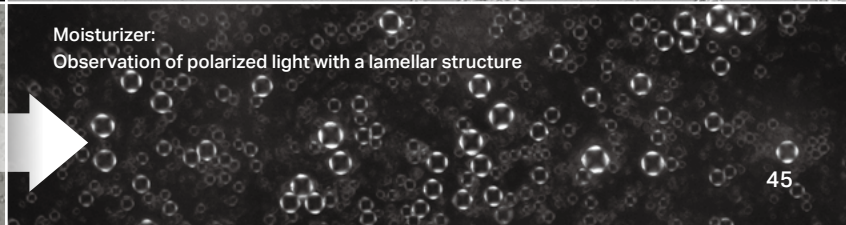

Observing asbestos phase contrast
using dye dispersion


Lung cancer ALK-FISH


Comet assay
(genotoxicity test)


Double emulsion
10 µm


Moisturizer: Brightfield


Moisturizer:
Observation of polarized light with a lamellar structure

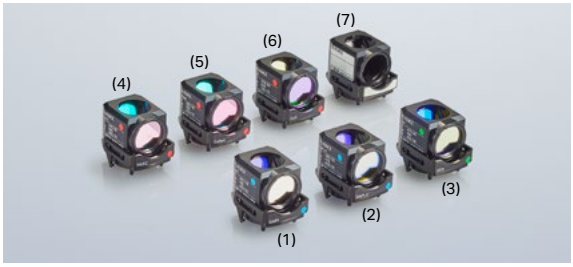
BZ-X Lens Specifications

Product name	Model	N.A.	Working distance (mm inch)	Special remarks
(1) Plan Apochromat 2X	**BZ-PA02**	0.10	8.5 0.33"	—
(2) Plan Apochromat 4X	**BZ-PA04**	0.20	20.0 0.79"	—
(3) Plan Apochromat 10X	**BZ-PA10**	0.45	4.0 0.16"	—
(4) Plan Apochromat 20X	**BZ-PA20**	0.75	0.6 0.02"	—
(5) Plan Apochromat 40X	**BZ-PA40**	0.95	0.25 to 0.17 0.010" to 0.007"	—
(6) Plan Apochromat 60X Oil	**BZ-PA60**	1.40	0.13 0.005"	Oil immersion
(7) Plan Apochromat 100X Oil	**BZ-PA100**	1.45	0.13 0.005"	Oil immersion
(8) Plan Fluorite 4X PH	**BZ-PF04P**	0.13	16.5 0.65"	Phase contrast
(9) Plan Fluorite 10X PH	**BZ-PF10P**	0.30	14.5 0.57"	Phase contrast
(10) Plan Fluorite 20X LD PH	**BZ-PF20LP**	0.45	8.8 to 7.5 0.35" to 0.30"	Phase contrast
(11) Plan Fluorite 40X LD PH	**BZ-PF40LP**	0.60	3.3 to 2.2 0.13" to 0.09"	Phase contrast

HR Fluorescence Filter Set Specifications

Unit: nm

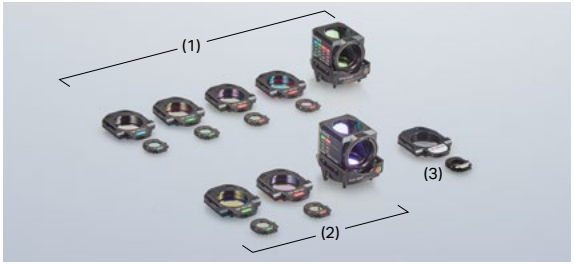
Product name	Model	Excitation wavelength	Emission wavelength	Dichroic mirror wavelength
(1) HR filter DAPI	**OP-89160**	360/40	460/50	400
(2) HR filter DAPI-V	**OP-89161**	395/25	460/50	425
(3) HR filter GFP	**OP-89162**	470/40	525/50	495
(4) HR filter TRITC	**OP-89163**	545/25	605/70	565
(5) HR filter TxRed	**OP-89164**	560/40	630/75	585
(6) HR filter Cy5	**OP-89165**	620/60	700/75	660
(7) Blank HR filter cube	**OP-89159**	—	—	—



Multi-band Fluorescence Filter Set Specifications

Unit: nm

Product name	Model	Supported	Excitation wavelength	Emission wavelength	Dichroic mirror wavelength
(1) Multi-band Type89000	**OP-89167**	DAPI	402/15	455/50	428
		GFP	490/20	525/36	503
		TRITC	555/25	605/52	571
		Cy5	645/30	705/72	660
(2) Multi-band Type89021	**OP-89199**	GFP	470/40	525/50	495
		TxRed	572/35	632/60	595
(3) Blank filter cover	**OP-89168**	—	—	—	—



Optional accessories

Sliding holder frame
OP-89155

Sliding holder frame
(for time-lapse imaging)
OP-89169

Fixed holder frame
OP-89156

Sample holder set (for slides and 35 mm 1.38" dishes)
OP-89157

General-purpose frame set
OP-89158

Control PC
English version: **972395**
Japanese version: **972394**

LCD monitor
972364

Temperature/CO_2 regulation chamber
With gas mixer: **972082**
For 5% CO_2 gas: **972083**

Immersion oil
971806

Accessories

Standard set
BZ-A1

AC cable
OP-99011

Specifications

Model		BZ-X1000/BZ-X1100
Microscope unit	Observation modes	Brightfield, Fluorescence (max. 11 ch.; wide-field/sectioning), Phase contrast (PhL, Ph1, Ph2), Oblique illumination
	Objective lens switching	Six-mount motorized revolver
	Motorized XY stage	114 × 80 mm 4.49" × 3.15" stroke, minimum 1 µm pitch
	Motorized Z stage	8 mm 0.31" stroke, minimum 0.1 µm pitch
	Motorized filter turret	Installation of up to 6 filters, Automatic position recognition
	Motorized filter wheel	Installation of up to 6 filters, Automatic position recognition
	Fluorescent incident illumination	Optical sectioning system
	Fluorescence dimming mechanism	Electronic dimming (10%, 20%, 40%, 100%)
	Transmitted illumination optical system	Working distance: 45 mm 1.77", LED lighting
	Transmitted illumination mechanism	Electronic brightfield aperture (0%, 20%, 40%, 60%, 80%, 100%), Phase contrast slit (PhL, Ph1, Ph2)
	Transmitted light source	24 W LED
	Fluorescent incident light source	48 W LED
	Specimen enclosure	Stage fully contained in a built-in darkroom
Camera unit	Image receiving element	2/3 inch, 10 megapixel monochrome CMOS (with color switching)
	Output signal, gradations	14-bit (high-quality interpolation)/12-bit/8-bit monochrome, 8-bit R/G/B
	Frame rate	19 fps for monochrome recording (up to 100 fps), 9.2 fps for color recording
	Binning	2×2, 3×3, 4×4, 6×6, 8×8
	Number of pixels in recorded image	7328 × 5496 max. (40-megapixel, high-quality interpolation)
	Video capturing	9.2 to 100 fps
	Electronic shutter	Auto, 60 microseconds to 60 seconds
	Gain	0 to 24 dB
	White balance	Push-set, manual
	Black balance	Push-set, manual
	Observation software	Multi-color image capturing, Auto focus, Quick full-focus, Navigation, Scale display for capture condition reproduction, Motorized revolver and stage control, Low photobleach
Controller	Supported OS	Windows®11 Pro, 64-bit
	PC interface	USB 3.0
	Dimensions	Head: 515.1 (H) × 346.2 (W) × 508 (D) mm 20.28" (H) × 13.63" (W) × 20.00" (D)*1; Controller: 227.5 (H) × 128.4 (W) × 409 (D) mm 8.96" (H) × 5.06" (W) × 16.10" (D)
	Weight	Head: Approx. 29 kg 63.93 lb, Controller: Approx. 4.7 kg 10.36 lb
	Power voltage	100 to 240 VAC ±10%, 50/60 Hz
	Power consumption	200 VA or less
	Overvoltage category	II
	Pollution degree	2
Optional modules	BZ-H5XF/Sectioning Module	Optical sectioning imaging
	BZ-H5XJ/Stitching and Multi-Point Imaging Module	Image stitching, Multi-point & multi-condition capturing
	BZ-H5XZ/Z-Stacking Module	Z-stack capturing
	BZ-H5XI/Image Cytometer Module	Batch capture (user location specified/all locations specified/random location specified) *BZ-H5XZ and BZ-H5XJ required / Image cytometer, batch analysis *BZ-H5C required
	BZ-H5XT/Time-lapse Module	Time-lapse imaging, Video capturing, Time-series brightness measurement
Analysis options	BZ-H5A/Analysis Application	Image stitching, Haze reduction, Full focus, File finder
	BZ-H5M/Measurement Application	Dimension measurement, Area measurement, Brightness measurement (line profile, histogram)
	BZ-H5R/3D Analysis Application	3D display, 3D measurement, XYZ slicing, Maximum projection, Video saving, 3D cell count (with addition of BZ-H5C)
	BZ-H5K/Motion Analysis Application	Motion tracking, Motion analysis, Time-series cell count (with addition of BZ-H5C)
	BZ-H5C/Hybrid Cell Count	Cell count (Phase contrast, Brightfield, Fluorescence), Mask cell count
	BZ-H5CM/Macro Cell Count	Macro cell counting (Batch analysis of multiple images)

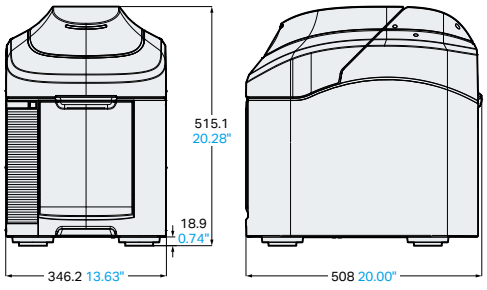
*1 Panel closed

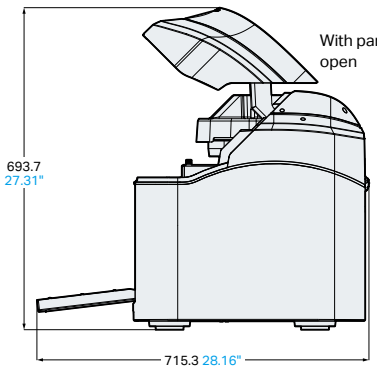
• Windows is either a registered trademark or trademark of Microsoft Corporation in the United States and/or other countries.

Dimensions

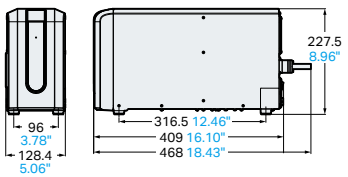
Unit: mm inch

Head unit
BZ-X1100





Controller unit
BZ-X1000



Imaging and Analysis Application Examples,
User Testimonials, and Academic Publications

Discover the latest in microscopy here

CONTACT YOUR NEAREST OFFICE FOR RELEASE STATUS

KEYENCE CORPORATION OF AMERICA
500 Park Boulevard, Suite 200, Itasca, IL 60143, U.S.A.
+1-201-930-0100 keyence@keyence.com

KEYENCE CANADA INC.
6775 Financial Dr., Suite 400, Mississauga, ON. L5N 0A4, Canada
+1-905-366-7655 keyencecanada@keyence.com

KEYENCE MÉXICO S.A. DE C.V.
Av. Paseo de la Reforma 243, P11, Col. Cuauhtémoc, C.P. 06500, Del. Cuauhtémoc, Ciudad de México, México
+52-55-8850-0100 keyencemexico@keyence.com

CALL TOLL FREE
1-888-539-3623
1-888-KEYENCE
TO CONTACT YOUR LOCAL OFFICE

03KA-2024-2
KA-US 2045-1 689132