cellSens functions

✓ : included functions / : optional solutions

		DIMENSION	STANDARD	ENTRY
Layout	User experience customization	✓	✓	✓
View	Overlay multiple images	✓	✓	
	Document groups for side-by-side image comparison	✓	✓	✓
	Movie playback	✓	✓	✓
	Tile view (multiple images in a single data set shown side-by-side)	✓	✓	✓
	Slice view for orthogonal plane viewing of 3D or time-lapse data sets	✓		
	Voxel viewer for isosurface and volumetric rendering of 3D and 4D data sets	✓		
Image Acquisition	Snap/movie acquisition	✓	✓	✓
	Time-lapse at specified interval	✓	✓	
	Automated multi-wavelength	✓	Multichannel Acquisition	
	Z-stack	✓		
	Multi-dimensional (XYZT and wavelength)	✓		
	Graphical Experiment Manager	✓		
	Manual panoramic imaging (Instant MIA and Manual MIA)	✓	Manual process	
	Multiposition visitation and stage navigator	Multiposition	Multiposition	
	Automated panoramic imaging (auto MIA, requires motorized stage)	Multiposition	Multiposition	
	Instantly create EFI image (manual or motorized Z)	✓	Manual process	
	Simultaneous Multi-Color Imaging (requires two identical cameras or image splitter)	Ratio/FRET or High-End Device		
	Live deblurring	✓		
	High Dynamic Range Imaging (HDRI)	✓		
	Multi-Well Plate Acquisition	Multiposition and Well Plate Navigator		
Image Processing	Geometry/combine/filter processing	✓	✓	
	Fluorescence/Brightfield unmixing	✓		
	Deblurring (No/Nearest Neighbor, Wiener Filter)	✓		
	Kymograph	✓		
	2D deconvolution	✓		
	3D deconvolution (constrained iterative deconvolution)	CI Deconvolution		
Image Analysis	Region and line measurements	✓	✓	
	Phase analysis	✓		
	Object analysis and classification	Count & Measure	Count & Measure	
	Interactive measurement	✓	✓	✓*
	Intensity plot over time/z	✓		
	Colocalization	✓		
	Object counting (Manual)	✓	✓	
	Object tracking	Count & Measure and Tracking		
	Online ratio and kinetics	Ratio/FRET		
	Ratio analysis (off-line)	✓		
	FRET analysis	Ratio/FRET or Life science analysis		
	FRAP analysis	Photo manipulation or Life science analysis		
	Cell count and confluency measurements	✓	Confluency Checker	
Documentation and Collaboration	Automatically compose MS Word reports	✓		
	Database image and data management solution for microscopy	Database Core	Database Core	
	Open database and load records/documents from database	Database Client	Database Client	Database Client
Remoting	Remote live image viewing	NetCam	NetCam	

* 3 points angle, 4 points angle, arbitrary line, closed polygon, polyline, and perpendicular line only.

Products with confirmed functionality

			DIMENSION	STANDARD	ENTRY
Olympus	Camera	DP21, DP22, DP26, DP27, DP72*1, DP73*2, DP74*4, DP80*2	✓	✓	✓
	Microscope	BX43, BX53, BX63, BX61, BX61WI, IX83, IX73, IX81, SZX16A	✓	✓	
		IX81-ZDC, IX81-ZDC2, IX3-ZDC, IX3-ZDC2	✓		
	Peripherals	BX-DSU, IX3-DSU, IX2-DSU, U-CBF	✓		
	Motorized XY stage	BX3-SSU, IX3-SSU	Multiposition	Multiposition	
OSIS	Camera	XM10, XC10, XC30, XC50, UC30, UC50, UC90*3, LC20, LC30, SC30, SC50, SC100, SC180	✓	✓	✓
	Peripherals	cell^TIRF (multi-line, single line), MT20, USB-ODB converter, Real Time Controller (U-RTC and U-RTCE), U-FCB, U-STC, IX3-FRAP	✓		

*1 DP72 does not support Windows 8.1/10 32-bit/64-bit. *2 DP73/80 supports only Windows 7/8.1/10 64-bit.
*3 UC90 is not available in some areas. *4 DP74 does not support Windows 8.1/10 32-bit.

3rd party products with confirmed functionality

			Note
Andor	Camera	iXon series, Zyla series, Neo	Requires High-End Camera solution
Hamamatsu		ORCA series, ImagEM series, C11440-36U	Several cameras require High-End Camera solution
Photometrics		CoolSNAP HQ2, Evolve 512 Delta, Prime, Prime 95B	
Qimaging		MicroPublisher 3.3 RTV/5 RTV, Exi series, QI Click, Retiga series, OptiMOS, Rolera Thunder	
Jenoptik		ProgRes C3, ProgRes C5	Available in cellSens Standard and Dimension
Prior	Peripherals	ProScan I, II, III, Optiscan II,III	Available in cellSens Dimension, and requires Multi Position Solution for motorized stage use
Ludl		MAC6000	
Objective Imaging		Oasis 4i	
Märzhäuser		Tango, Pilot stage	
Applied Scientific Instrumetation		MS-2000	
Vincent Associates		Uniblitz shutter (VCM-D1, VMM-D1, VMM-D3)	Available in cellSens Standard and Dimension
CoolLED		pE-1, pE-2, pE4000	Available in cellSens Dimension
Excelitas		X-Cite 120 PC, X-Cite exacte, X-Cite XLED1, X-Cite110LED, X-Cite120LED, X-Cite TURBO	
Lumencor		SOLA SEII, SEII 365, Spectra X	
Sutter		Lambda 10-3/10-B, Lambda DG4	
National Instruments		NI USB-6501	
Yokogawa		CSU-X1	Requires High-End Device solution

Compatible image formats

Read and write	JPEG, JPEG2000, TIFF, BMP, AVI, PNG, VSI
Read only	GIF, PSD (Adobe PhotoShop), TIFF (DP-BSW, FSX100, MetaMorph), OIF/OIB/OIR (FLUOVIEW format), Cell, STK (MetaMorph), MRC (Medical Research Council)

Recommended system requirements

OS*	Microsoft Windows 10 Pro (32-bit/64-bit) Microsoft Windows 8.1 Pro (32-bit/64-bit) Microsoft Windows 7 Ultimate/Professional (32-bit/64-bit) with SP1
OS Language	English, Simplified Chinese, Japanese, German, Russian (Entry and Standard) and Italian (Entry and Standard)
RAM /HDD / DVD drive	4GB or more is recommended / 1GB for installation / DVD-R DL compatible

*cellSens Dimension and Dimension Desktop are only compatible with 64-bit operating systems.
*See detailed information: http://www.olympus-lifescience.com/en/software/cellsens/

Image data courtesy of:
Hiroo Ueno, Ph.D. Department of Stem Cell Pathology, Kansai Medical University
(cover page)

www.olympus-lifescience.com

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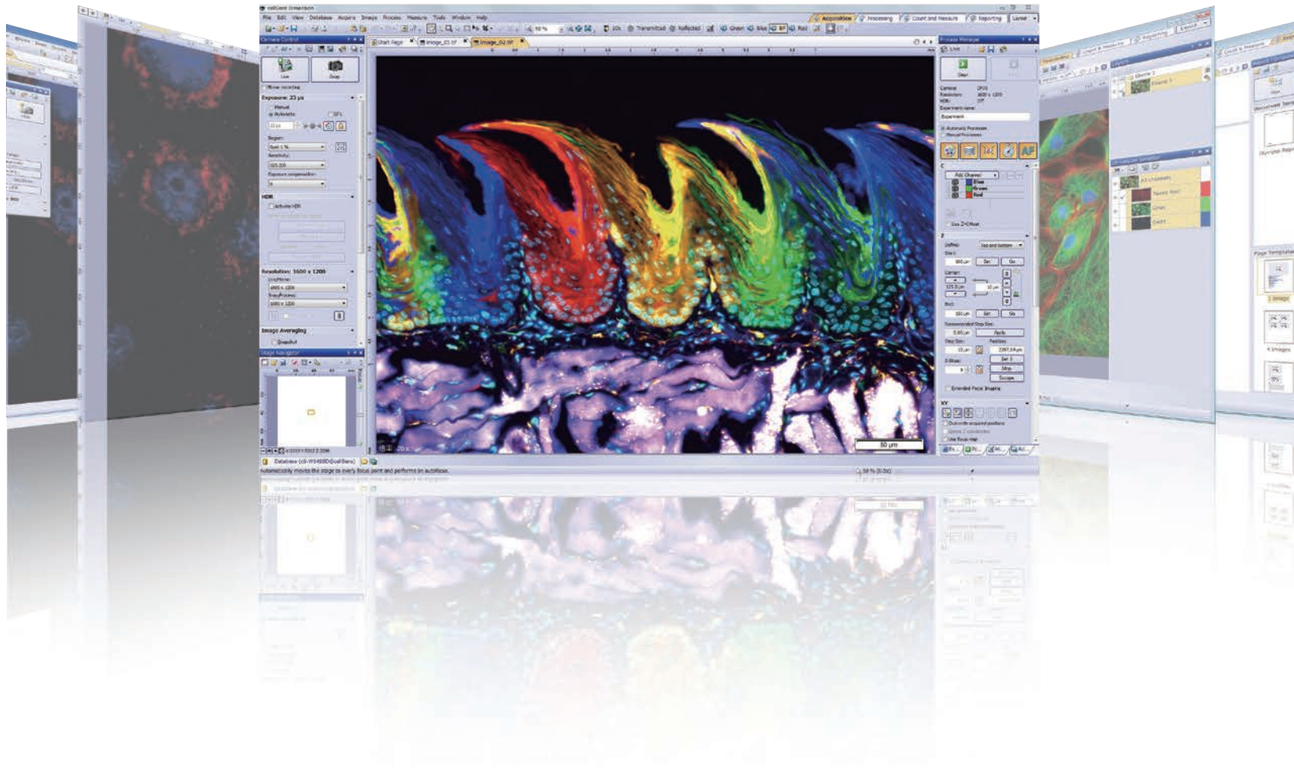
OLYMPUS®
Your Vision, Our Future

Imaging Software

cellSens

Intuitive Operation. Seamless Workflow.



Not for clinical diagnostic use.

Simplify Experiment Design—Leave More Time for Research

Olympus cellSens software simplifies your workflow:

-Intuitive user interface.

-User-specified configurations to fit your application.

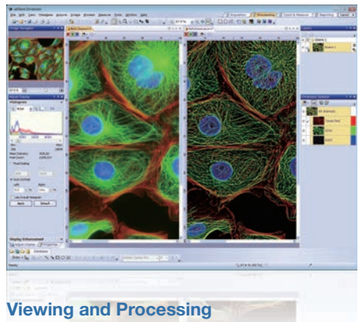
-Seamless functionality from image capture through report creation.

Spend less time with your imaging software and make faster progress toward your research goals.

Imaging

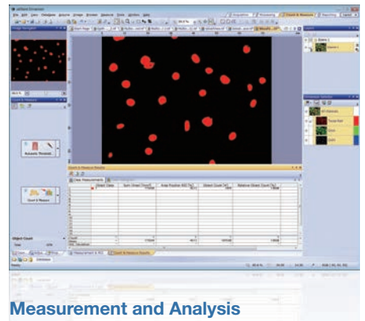
Image Capture
Capture multicolor, time-lapse, and z-stack images with ease. Select the appropriate capture button, add relevant parameters, and click "Start." The Process Manager and Experiment Manager make multidimensional imaging easy.

Processing



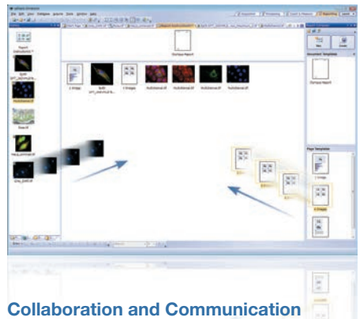
Viewing and Processing
View your data in the layout that looks good to you. Take advantage of advanced image processing functions, such as stitching, extended focus, deconvolution, and unmixing to prepare your data for analysis.

Analyzing



Measurement and Analysis
cellSens features region of interest, phase analysis, and cell counting capabilities. Export raw measurement data to MS Excel or a cellSens workbook with a single click.

Reporting



Collaboration and Communication
Customizable database and reporting solutions enable active collaboration with colleagues and coworkers. These functions make it simple to manage, share, and distribute images and analysis.

Microscopy Research with a Personal Touch

Olympus microscopes enable new imaging techniques and push the boundaries of resolution at all magnifications. Olympus cellSens software improves productivity with efficient acquisition workflow, image processing capabilities, and analytical strength. Centered around the needs of demanding customers, cellSens software is flexible, customizable, and designed to adapt as application requirements evolve.

Reduce Clutter by Displaying Only the Tools and Windows You Need

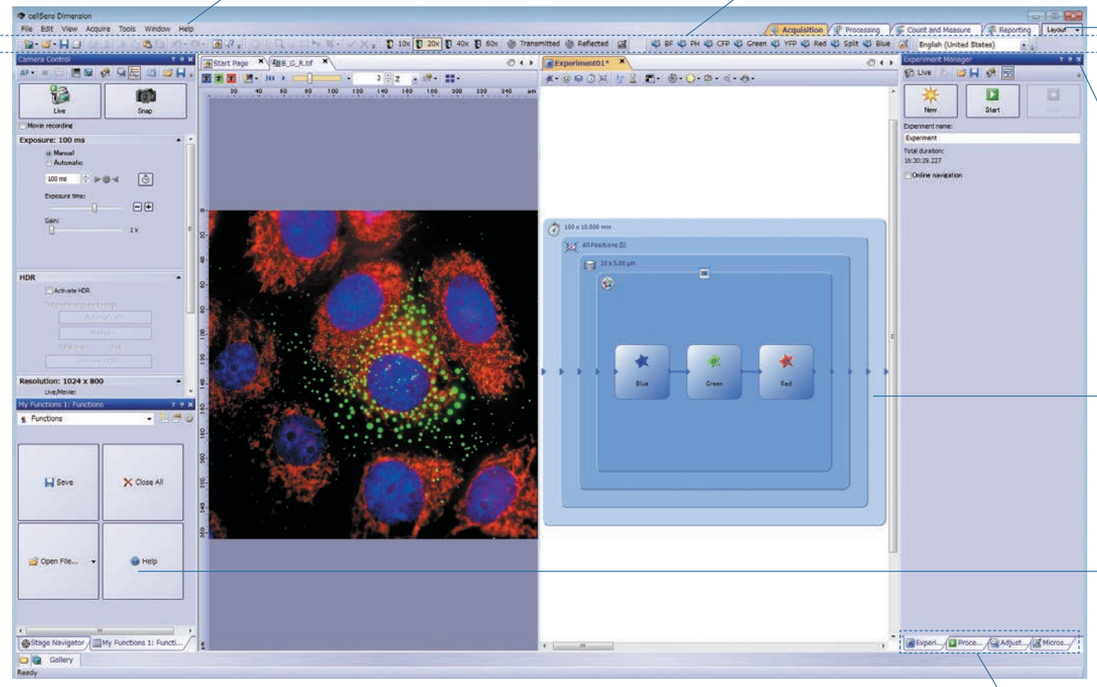
It's Time to Get Personal

Olympus has been at the forefront of microscopy for over 90 years, developing microscopes and systems supporting a broad range of applications. As a result, we understand that your research has individual requirements that require individual solutions. All cellSens software features an easy-to-use interface that you control and customize according to your needs.

Dynamic Interface

Workflow efficiency requires careful definition of tasks and tools at every stage. cellSens software has a dynamic interface that helps provide the tools you need, which are clearly available at each step. Olympus has created a number of interface layouts, each developed with capabilities appropriate to the user's needs.

- **Acquisition Layout**
  —Select between different acquisition processes and adjust the camera settings.
- **Processing Layout**
  —Post-acquisition functions such as image processing, measuring, collecting data, and presenting the resulting statistics.
- **Count & Measure Layout**
  —Manual and automated measurement and object counting.
- **Reporting Layout**
  —Generate reports to document and share results.
- **Create Layout**
  —Define customized layouts to suit any workflow.

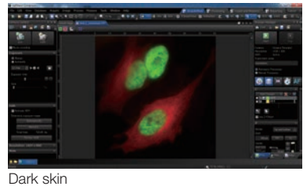


Camera Control Panel

Camera control and configuration is a central aspect of the cellSens workflow. Parameters such as exposure time and pixel binning are just two examples of typical camera settings available to optimize image quality. cellSens Entry and Standard include control and configuration for all Olympus digital cameras and microscopes. cellSens Dimension software includes precision control over research grade cameras when the most sensitive scientific grade detector is required.

Dark Application Skin

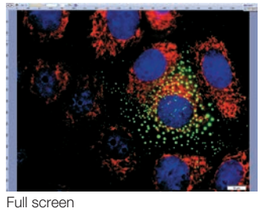
The Dark Application Skin reduces ambient light from the computer monitor, enabling cellSens software users to better maintain darkened environments during imaging, with an interface design that remains highly visible and usable.



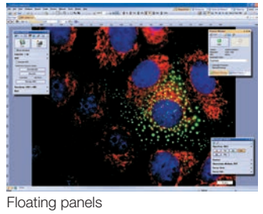
Dark skin

Create your own Layout

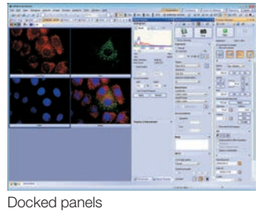
Organize the tools and windows for the job at hand to create a functional layout that works best for you.



Full screen



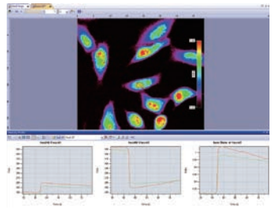
Floating panels

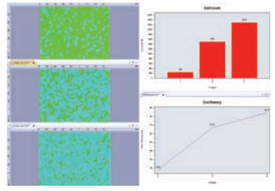


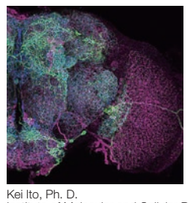
Docked panels

Solutions to Empower Your Research

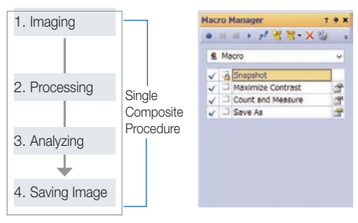
Scientific Research Need	Our Answers
Quickly define complex experiments without programming	**Graphical Experiment Manager (GEM)** Design experiments by connecting various command icons. Image acquisition is available for up to 6 dimensions (XYZT multipoint).
Study cell dynamics with fluorescent markers	**Intensity Analysis** Visualize changes in intensity over time and save this information for later analysis. Ratio Analysis functions enable calibration, display, and analysis of live/stored data reflecting changes in the intensity ratio between two acquisition channels.
Measurement of cell count and confluency without stain	**Cell Confluency Measurement** Measure cell count and confluency using phase contrast images. Create cell growth curves with improved accuracy based on larger sample populations by automatically including multiple images within your analysis.
Improved image detail	**Deconvolution** Apply proprietary and highly efficient post-processing tools for both CCD and confocal imaging to enhance the ability to differentiate between objects. Choose between 2D and optional 3D blind deconvolution.
Automate repeating tasks	**Macro Manager** Use the macro manager to automate typical acquisition and data analysis workflows. Macro commands can be applied to multiple images simultaneously and can reduce the time required to complete complex imaging and image analysis.



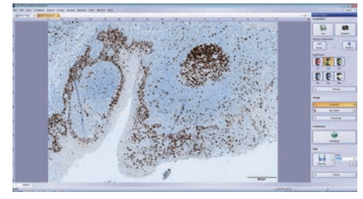


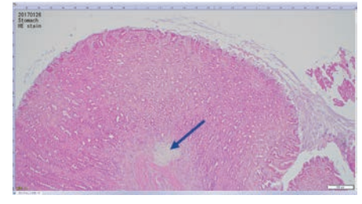


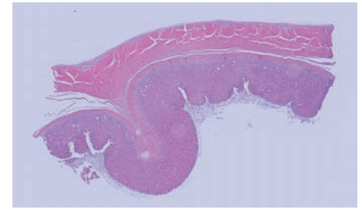
Kei Ito, Ph. D.
Institute of Molecular and Cellular Biosciences, University of Tokyo

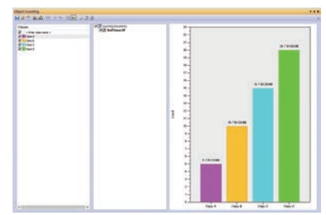


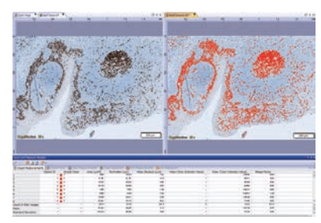
Clinical Research Needs	Our Answers
Simplification of image acquisition	**Simple Layout** ▶MOVIE The "Simple Layout" improves efficiency and workflows for all users from novice to expert. All image acquisition functions are easily accessible for intuitive operation. This enables even untrained users to obtain excellent results.
Image conferencing and consultation	**Conference mode** ▶MOVIE Fit live and static imaging to the display for the best presentation. Various annotation and graphical annotation tools are at your fingertips.
Observe an entire large sample at once	**Panoramic Imaging** ▶MOVIE Create seamless panoramic and accurately stitched images using a motorized stage. Real-time stitching mode produces wide area scans using a manual stage.
Speed up manual counting procedures	**Object Counting** Perform manual counts with user defined classes. Generate counts and proportions for each class at the click of a mouse.
Nuclei counting with variable thresholding	**Particle Analysis** Set threshold levels for nuclei counts, or calculate parameters such as tissue slice total area and area ratios.











A Range of Easy-to-Use Functions
Turn Your Findings into Compelling Presentations

Image Capture

Graphical Experiment Manager (GEM)

Dimension

GEM is a flexible drag-and-drop interface to build simple or complex experiments within cellSens software. Combine actions within specialized frames to dictate the order and priority of automation. Easily acquire multichannel, Z-stacks, and time-lapse imaging across one or more sample positions. Perform two-channel simultaneous imaging within GEM using the cellSens High-End Device solution. GEM permits users to interact with the system during long timelapse imaging without terminating the experiment.

Capture command

Loop command

Capture Multidimensional Images

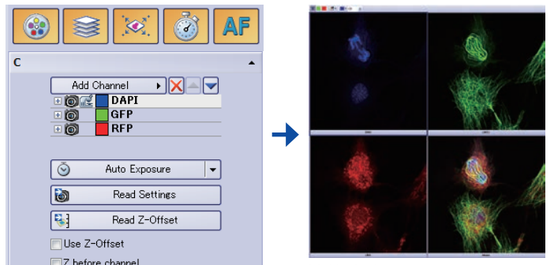
Dimension

The Process Manager makes it easy to capture multicolored and multidimensional images with just a couple of clicks when imaging with a motorized stage.

Dimension + Multiposition

Standard + Multiposition

The optional multiposition solution is used to automatically capture multipoint and large area images.



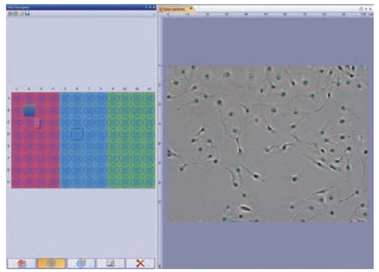
Process Manager Setting

Multicolor images

Well Plate Navigator

Dimension + Multiposition + Well Plate Navigator

The Well Plate Navigator automatically scans and acquires images from standard and customized well plate formats. All acquired images, sample positions, and user comments can be saved into a structured database for rapid centralized access. Move to the center of any well in a single click. Wells can be selected individually, by row or column, or in discontinuous groups. Apply unique multidimensional acquisition settings to a single well or multiple selected wells in one step. The Well Plate Navigator can execute multiple experiments within a single well plate in support of complex experiments.

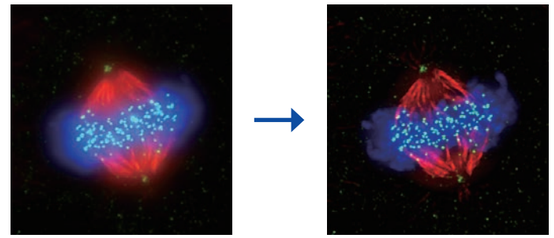


Viewing and Processing

Deconvolution

Dimension + CI Deconvolution

Olympus' optional constrained iterative (CI) Deconvolution Solution employs robust CI MLE algorithms to produce improved resolution, contrast, and dynamic range, with industry-leading speed. Each cellSens Dimension software license includes the most widely requested deblurring techniques such as 2D deconvolution, nearest neighbor, and Wiener filter.



Original image

Deconvolved image

Cell line: Human cervical cancer cell line HeLa cell
Immunostaining: Hec1 staining (green, Alexa Fluor 488), α-tubulin staining (red, Alexa Fluor 568), DAPI staining (blue)
Mitotic HeLa cell derived from human cervical cancer.
Mitotic spindle and kinetochores are stained with anti-α-tubulin (red) and anti-Hec1 (green) antibodies, respectively. Chromosomes interact with microtubules constituting mitotic spindle via kinetochores, protein structure assembled on centromere region of chromosomes.

Image data courtesy of:
Department of Molecular Oncology, Institute of Development, Aging and Cancer, Tohoku University
Masanori Ikeda and Kozo Tanaka

Real-time panoramic imaging

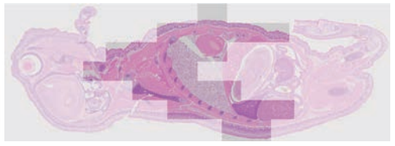
▶MOVIE

Dimension

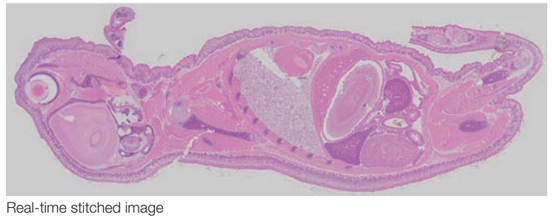
Standard + Manual Process

Create panoramic images in real-time by freely moving the manual stage with the Manual Process solution. Manual Process Control is available as an option for cellSens Standard software and included within cellSens Dimension software.

Stage control



Real-time stitching



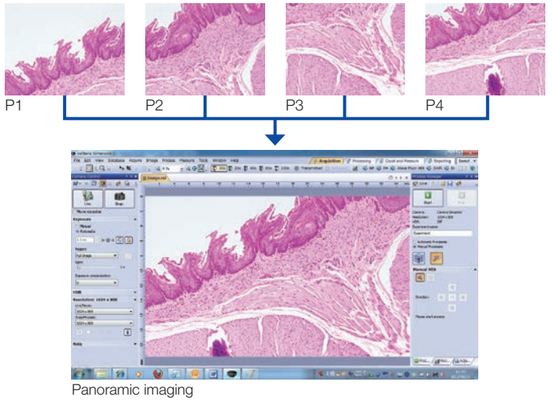
Real-time stitched image

Motorized panoramic imaging

Dimension + Multiposition

Standard + Multiposition

With cellSens Dimension or Standard software, wide area imaging using a motorized stage is fully automated with the optional Multiposition solution. When combined with Dimension and a motorized Z, this function can correct for the effects of sample distortion and tilting.



Panoramic imaging

Extended Focus Imaging

Dimension

Standard + Manual Process

Create a single in-focus image from successive image planes as the focus knob is turned using the Extended Focus Imaging (EFI) function. A motorized focus drive fully automates EFI acquisition. EFI composite images can also be created directly from previously captured Z-stacks.

Original image

Extend Focus Image

Solutions

Each cellSens software package can be expanded for specific applications by adding on the available "Solutions" noted below

Dimension

CI Deconvolution	Multiposition	Well Plate Navigator
Count & Measure	Ratio/FRET	Database Core
Database Client	NetCam	Photo Manipulation

Standard

Multichannel Acquisition	Multiposition	Count & Measure
Manual Process	Database Core	Database Client
NetCam	Confluency Checker	

Entry

Database Client

A Range of Easy-to-Use Functions
Turn Your Findings into Compelling Presentations

Measurement and Analysis

Manual Measurement

Dimension

Standard

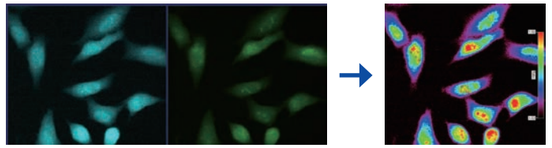
Entry

Distances between points, areas, intensity measurements, and morphological parameters are accessible using the cellSens software measurement tools. Measurement data is saved as an image layer that can be exported to MS Excel (except cellSens Entry) and cellSens workbook formats, or viewed using OlyVIA, a free image viewer software package.

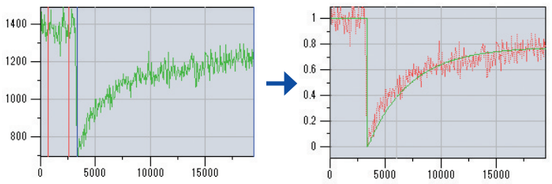
Intensity Analysis

Dimension

Graphically depict intensity and ratio values defined by Regions of Interest (ROIs) and adjust ROI placement to compensate for cell movement. Export data directly to MS Excel. Convert variations of intensity to hue and brightness using Intensity Modulated Display (IMD) to visually enhance the fine image structure within ratio or FRET. The Ratio/FRET solution is used to display and analyze real-time ratiometric imaging and data. FRET analysis of both sensitized emission and acceptor photo-bleaching is also supported within this user friendly workflow.
The Photo-Manipulation solution can be used for the curve-fitting analysis of FRAP images.



Ratio image display/analysis



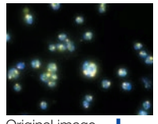
FRAP analysis function

Automatic Object Measurement and Classification

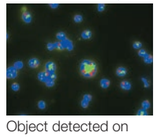
Dimension + Count & Measure

Standard + Count & Measure

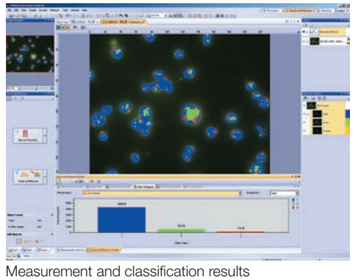
Count & Measure adds object detection for automated nuclei counting and classification. This solution extends the existing set of manual measurements in the cellSens software. Perform automatic object measurement and classification easily, using an interactive object based analysis that automatically links objects to their measurements.



Original image



Object detected on image



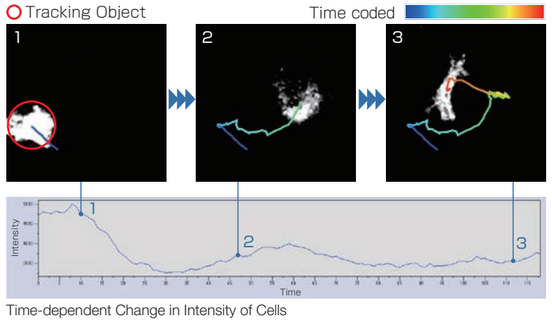
Measurement and classification results

Object tracking

▶MOVIE

Dimension + Count & Measure + Tracking

In time lapse imaging, moving objects can be automatically detected, tracked, and analyzed. cellSens Tracking provides a powerful and intuitive tool to quantify dynamic processes such as cell movement and division.



Time-dependent Change in Intensity of Cells

Image data courtesy of:
Kazuhiro Yagita, M.D. Ph.D. Department of Physiology and Systems Bioscience, Kyoto Prefectural University of Medicine

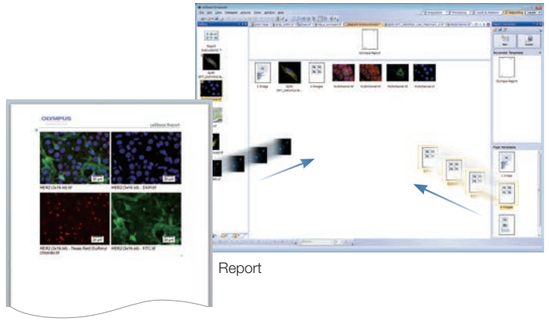
Collaboration and Communication

Reporting

Dimension

Easily drag-and-drop image property data, measurement data, and user-customized fields into a report template using the convenience of a built-in tool to produce reports in MS Word.* Collaborate with colleagues and communicate results quickly and easily.

**Requires Word version 2007 or later*



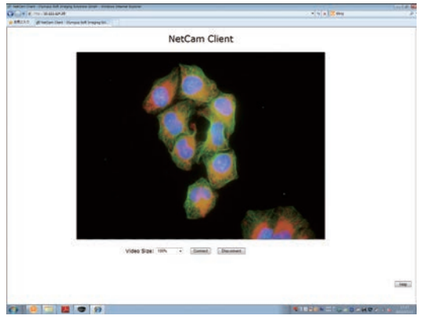
Report

Remote Live Image

Dimension + NetCam

Standard + NetCam

The cellSens NetCam solution facilitates the transfer of live or static imaging over a network for teaching, mentoring, or supervision.



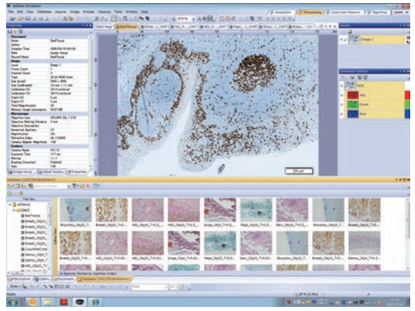
Database

Dimension + Database Core or Database Client

Standard + Database Core or Database Client

Entry + Database Client

The Database Core solution enables users to create shared, user-definable databases with full control over user access. The database stores images, associated image properties, user comments, and any other related files that a user wishes to include. The interactive query tool makes it easy to find the data and provides automatic previews of each queried image. Conveniently read and write to a shared database from different stations with the Database Client solution.



Combination of Database and Well Plate Navigator

Dimension + Multiposition + Well Plate Navigator
+
Database Core or Database Client

In combination with the Well Plate Navigator solution, the Database solution greatly improves the efficiency of viewing and analyzing well plate images with a large amount of data. By clicking on icons for image information such as the date, file name, or well plate number, any selection of captured images can be viewed for further analysis. This solution also enables users to view captured images and continuously analyze selected images (the Batch Macro function) via the well plate GUI.