celisens functions	5		0: 1 1	
		Dimension	Standard	Entry
Layout	User experience customization			<b>✓</b>
View	Overlay multiple images			
	Document groups for side-by-side image comparison	<b>✓</b>		<b>✓</b>
	Movie playback	<b>✓</b>	/	/
	Tile view (multiple images in a single data set shown side by side)	<u> </u>	/	
	Slice view for orthogonal plane viewing of 3D or time-lapse data sets	<u> </u>		
	Voxel view for isosurface and volumetric rendering of 3D and 4D data sets	<b>✓</b>		
Image Acquisition	Snap/movie acquisition	/		<b>✓</b>
	Time-lapse at specified interval	<b>✓</b>		
	Automated multi-wavelength	<b>✓</b>	Multichannel Acquisition	
	Z-Stack	<b>✓</b>		
	Multi-dimensional (xyzt and wavelength)	/		
	Graphical Experiment Manager	<b>✓</b>		
	Manual assisted panoramic imaging (manual MIA)	1	Manual Process	
	Multiposition acquisition and stage navigator	Multiposition		
	Automated panoramic imaging (auto MIA, requires motorized stage)	Multiposition		
	Instant EFI image (manual or motorized Z)	<b>/</b>	Manual Process	
	Simultaneous multi-color imaging (Image splitter needs)	Ratio/FRET High-End Device or		
	Live deblurring	✓		
	High Dynamic Range Imaging (HDRI)	✓		
	Multi-well Plate Acquisition	Well Picte Navigator Multiposition and		
	Geometry/combine/filter processing		/	
	Fluorescence unmixing	<b>√</b>		
	Brightfield unmixing	<b>√</b>		
Image Processing	Deblurring (No/Nearest Neighbor, Wiener Filter)	/		
	Kymograph	1		
	2D deconvolution	<b>√</b>		
	3D deconvolution (constrained iterative deconvolution)	CI Deconvolution		
	Region and line measurements		/	
	Phase analysis	<b>√</b>		
	Object analysis and classification	Count & Measure		
	Interactive measurement	<b>✓</b>	/	✓*
	Intensity plot over time/z	<b>√</b>		
	Colocalization	<b>✓</b>		
Image Analysis	Object Counting (Manual)	<b>√</b>	/	
	Online Ratio and Kinetics	Ratio/FRET		
	Ratio analysis (off-line)	<b>√</b>		
	FRET analysis	Ratio / FRET High-End Device or		
	FRAP analysis	Photo Manipulation Life Science Analysis		
D	Automatically compose Word reports	/		
Documentation and	Database image and data management solution for microscopy	Database Core	Database Core	
Collaboration	Save and load images/documents from Database	Database Client	Database Client	Database Client
Remoting	Remote Live Image Viewing			

Three points angle, four points angle, arbitrary line, closed polygon, polyline and perpendicular line only.

			Dimension	Standard	Entry
Olympus	Camera	DP20*1, DP21, DP22, DP25*2, DP26, DP27, DP70*1, DP71*2, DP72*2, DP73*3, DP80*3	1	1	1
	Missassas	BX43, BX53, BX63, BX61, BX61WI, IX83, IX73, IX81, SZX16A	✓	✓	
	Micoscope	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		
Olympus Soft Imaging Solutions	Camera	CC12, F-View II, Colorview I, Colorview II, Colorview III, Colorview IIII, Colorview IIII, XM10, XC10, XC30, XC50, UC30, UC50, SC20, SC30, SC50, SC100	✓	✓	✓
	Peripherals	cellTIRF (multi-line, single line), MT20, USB-ODB converter, Real Time Controller (U-RTC and U-RTCE), U-FCB, U-STC	✓		
Hamamatsu	Camera	ORCA R2, ORCA 03, ORCA 05, ORCA ERG, ORCA-Flash 2.8,	✓		
		ImagEM, ImagEMX2, ORCA-Flash 4.0 V2, ORCA-Flash 4.0 LT	High-End Camera		
	Image Splitter	W-View Gemini	Ratio / FRET High-End Device or		
Q-Imaging		MicroPublisher 3.3 RTV, MicroPublisher 5 RTV	1	✓	
	Camera	Monochrome: EXi Blue/Aqua, QIClick, Retiga Exi/SRV/2000R/2000RV/4000R/4000RV/6000			
	Camera	Color : Exi Aqua	✓		
		OptiMOS, Rolera Thunder	High-End Camera		
Photometrics	Camera	CoolSNAP HQ2	1		
	Camera	Evolve 512 Delta	High-End Camera		
	Image Splitter	Dual View DV2 /QuadView QV2	Ratio / FRET High-End Device or		
ındor	Camera	iXon X3 897, iXon Ultra 897, iXon Ultra 888, Zyla4.2(Camera-link,USB3.0), Zyla5.5(Camera-link 10tap,USB3.0), Neo	High-End Camera		
enoptik	Camera	ProgRes C3, ProgRes C5	1	1	
incent Associates	Shutter	Uniblitz shutter (VCM-D1, VMM-D1, VMM-D3)	1	1	
CoolLED	Light Source	pE-1, pE-2, pE4000	1		
xcelitas	Light Source	X-Cite 120 PC, X-Cite exacte, X-Cite XLED1, X-Cite110LED, X-Cite120LED	✓		
Sutter	Light Source	Lambda DG4	✓		
	Shutter, FW	Lambda 10-3/10-B	✓		
Prior	Motorized XY stage	Proscan (I, II, III), Optiscan (II, III)	Multiposition		
	Shutter, FW, Z-drive	Proscan (I, II, III), Optiscan (II, III)	✓		
	Piezo Z (control via Real Time Controller)		High-End Device		
udl	Motorized XY stage	Mac 6000	Multiposition		
uui	Shutter, FW, Z-drive	Mac 6000	✓		
bjective Imaging	Motorized XY stage controller	Oasis 4i	Multiposition		
Objective imaging	Z-drive controller	Oasis 4i	✓		
Märzhäuser	Motorized XY stage	Tango	Multiposition		
	Z-drive controller	Tango	✓		
Physik Instrumente	Piezo Z (control via Real Time Controller)	PIFOC P-721	High-End Device		
Applied Scientific nstrumetation	Motorized XY stage	MS-2000	Multiposition		
National Instruments	Digital TTL device	NI USB-6501	✓		
Yokogawa	CSU	CSU-X1	High-End Device		

OLYMPUS CORPORATION

OLYMPUS EUROPA SE & CO. KG

OLYMPUS SINGAPORE PTE LTD.

HDD DVD drive (Read: DVD-R DL)

Recommended for Windows 7: Microsoft Internet Explorer 8.0, 9.0, Recommended for Windows 8: Microsoft Internet Explorer 10, Microsoft Internet Explorer 10, Microsoft Internet Explorer 10, M

Image data courtesy of:

Department of Stem Cell Pathology, Kansai Medical University

www.olympus-lifescience.com

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For enquiries - contact

www.olympus-lifescience.com/contact-us

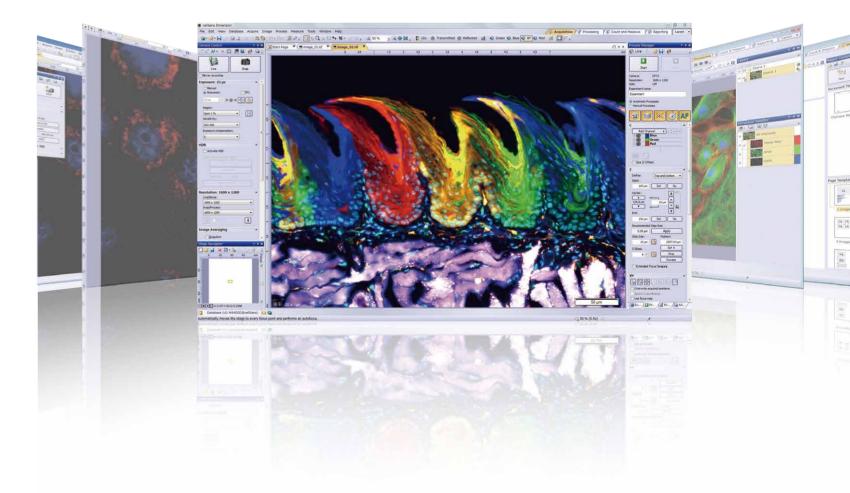
OLYMPUS SCIENTIFIC SOLUTIONS AMERICAS CORP. OLYMPUS MEDICAL SYSTEMS INDIA PRIVATE LIMITED.

OLYMPUS LATIN AMERICA, INC. OLYMPUS (CHINA) CO.,LTD. OLYMPUS KOREA CO.,LTD. OLYMPUS AUSTRALIA PTY. LTD. **OLYMPUS** Your Vision, Our Future

Imaging Software

cellSens

Seamless Workflow. Intuitive



Printed in Japan M1718E-092015

# Add Simplicity to Experiment Design... Leave More Time for Research

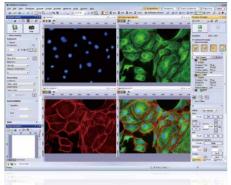
Olympus cellSens gives you a simpler way to work.

Enjoy full control over the user interface, with functions that are where you want them, when you need them.

Seamless operation, from image capture to report creation means more results with less effort.

Spend less time with your software. Have more time for research.

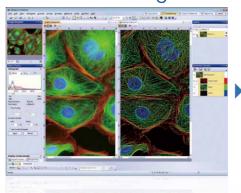
# **Imaging**



#### **Image Capture**

Capture multi-color, time lapse, and z-stack images with ease. Just select the appropriate capture button, add relevant parameters, and click "Start". The Process Manager or Experiment Manager make it easy to capture multidimensional image.

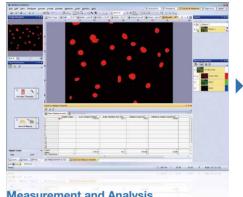
# Processing



#### Viewing and Processing

Automatically view your data in the colors and layout you choose. Take advantage of an array of advanced image processing functions, such as stitching, extended focus, deconvolution, and unmixing.

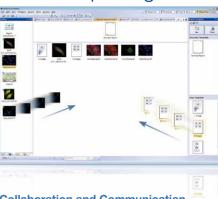
# Analyzing



#### **Measurement and Analysis**

Make measurements using an intuitive interface. cellSens offers region of interest, phase analysis, and cell count capability. Export raw measurement data to MS Excel or a cellSens workbook with a single click.

# Reporting

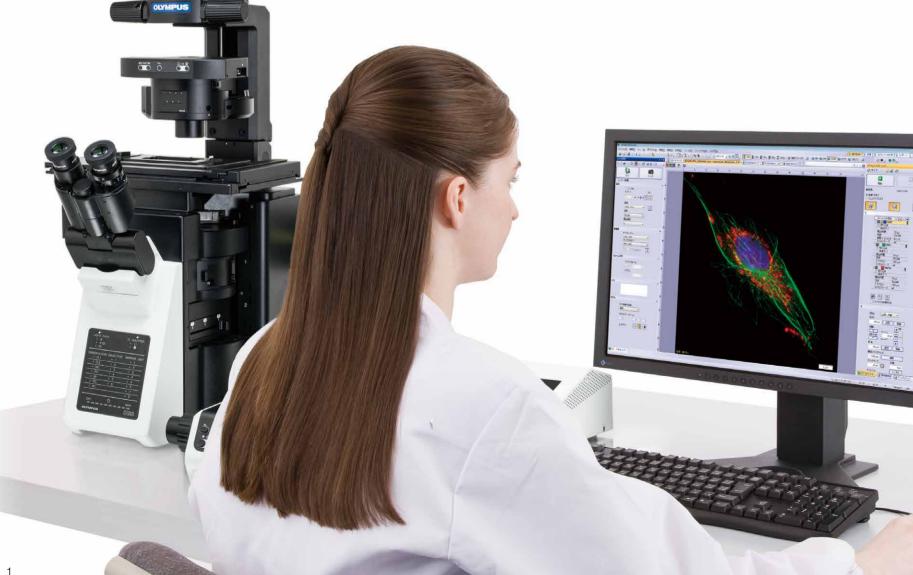


## **Collaboration and Communication**

Actively collaborate with colleagues and coworkers with special tools including Database and Reporting functions. These functions make it simple to manage, share, and distribute your own image and data

# Microscopy Research With a Personal Touch

Olympus microscopes enable new techniques and push the boundaries of resolution at all magnifications. Olympus cellSens software improves productivity with efficient acquisition work-flow, image processing capability and analytical strength. Centered around the needs demanding customers, cellSens is flexible, easily personalized, and designed to fit as application requirements evolve.



# Reduce Clutter and Confusion 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 and has developed microscopes and systems for a broad spectrum of applications. As a result, we know that each researcher has individual requirements that can't all be met by fixed solutions. The cellSens software family consists of three packages, all featuring a peerless user-definable interface. As a result, each user can define what they want cellSens to show them within the defined work areas.

#### **Dynamic Interface**

Creating an efficient workflow requires careful definition of the tasks and tools at each stage. With the cellSens platform's dynamic GUI, the same is true—the tools you need for each stage are clearly available, without clutter or the need to search. Olympus has created a number of interface layouts, which are developed with capabilities appropriate to the users needs.

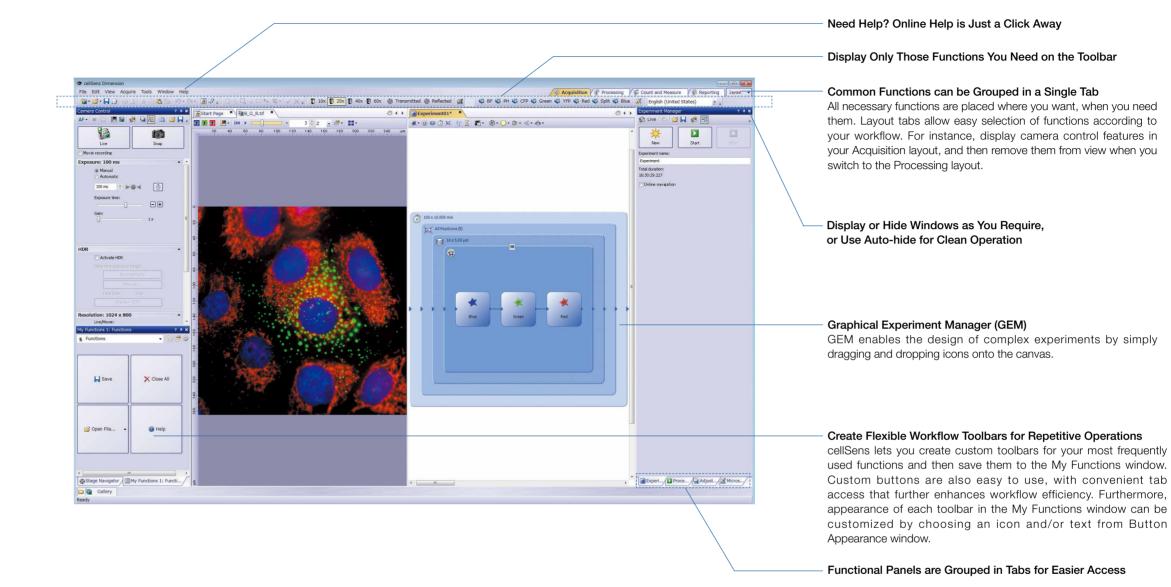
- Acquisition Layout—for selecting between different acquisition processes and adjusting the camera settings.
- Processing Layout—for post-acquisition functions such as image processing, execution of measurements, collection of data, presentation of resulting statistics.
- Count & Measure Layout—for manual and automated measurement and object counting.
- Reporting Layout-for generating reports to document and share results.
- Create Layout—a user can define his or her own layout in various arrangements.



#### **Camera Control Panel**

The most important microscope component that requires software control when imaging is the digital camera. Modern cameras feature a number of functions that can be changed to enhance or perfect an image; for example, exposure time and pixel binning. The cellSens Entry and Standard packages control such features on all Olympus digital microscopes and cameras. The Dimension package, in addition, controls such features on highend research cameras as well. As a result, scientists can maximize the quality of their images.





#### **Dark Application Skin**

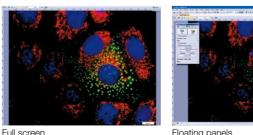
The Dark Application Skin reduces computer monitor-generated ambient light and allows cellSens users to adapt to darkened environments; icon contrast remains high for easy recognition and quick selection.





#### **Arrange Windows as You Like**

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





Docked panels

Floating panels

# Solutions to Empower Your Individual Research

# **What Scientific Researchers Wanted**

### **Our Solutions**

Complex experimental procedure with flexible design

# **Graphical Experiment Manager (GEM)**

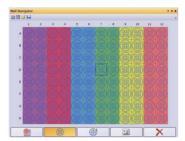
Experiments can be freely designed simply by connecting the various commands. Furthermore, image acquisition is available for up to 6 dimensions (XYZT $\lambda$  multipoint).



Flexible well plate image capture

#### **Well Plate Navigator**

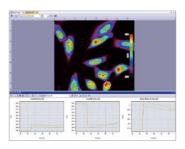
Capture well plate samples automatically by using the well plate navigator in combination with the motorized stage. There is also enhanced flexibility to allow multiple experiments to be executed within a single well plate.



Intensity analysis

#### **Intensity Analysis**

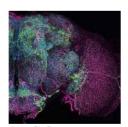
Visualize changes in intensity over time, and save this information for later analysis. Ratio Analysis function allows calibration, display and analysis of live/stored data reflecting changes in the intensity ratio between two acquisition channels.



Improved image detail

#### Deconvolution

Choose between 2D (included) and 3D (optional) blind deconvolution. This proprietary and highly efficient post-processing tool for both CCD and Confocal imaging enhances the ability to differentiate between imaged objects.

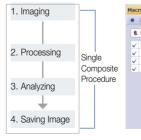


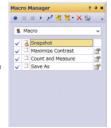
Kei Ito, Ph. D. Institute of Molecular and Cellular Biosciences, University of Tokyo

Unified task order management



Perform tasks, from imaging to processing and analysis, as a single composite procedure. Batch processing is also available, enabling multiple images to be subjected to preferred processes as a continuous series for a significant improvement in workflow efficiency.





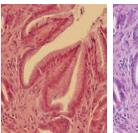
# What Medical Researchers Wanted

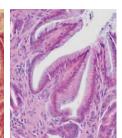
#### **Our Solutions**

Retention of intact observed images



Simply align the focus and select the appropriate white balance to capture images with true-to-life quality.

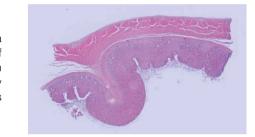




Observe large sample at once

#### **Panoramic Imaging**

Create clear and seamless wide area images by automatic correction of mismatching between each images, even when using the manual stage. A fully functional wide-area focus map enables improved clarity in panoramic imaging.

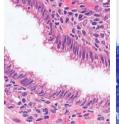


Simultaneously monitoring of multiple images

## **Image Comparison**

(simultaneous image windows)

Display images side by side for accurate comparison, with simultaneous zooming and movement.

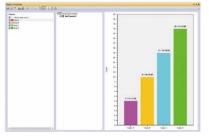




Cell counting by hands

# **Object Counting**

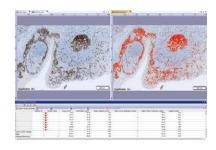
Perform manual counts with self-set classes. Counts and proportions can then be undertaken for each class through simple mouse operation.



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.



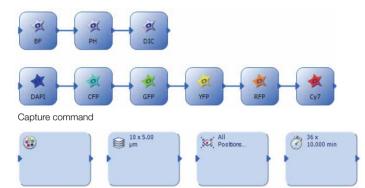
# An Array of Easy-to-Use Functions Turn Research Finding into Compelling Presentations

## **Image Capture**

#### **Graphical Experiment Manager (GEM)**

#### Dimension

A break from the usual complex panel-based interfaces, the Graphical Experiment Manager (GEM) uses a flexible drag-and-drop interface to build simple or complex experiments within the cellSens workspace. Actions can be combined within specialized frames to dictate the desired order and priority of automation and imaging. Easily acquire multichannel imaging, Z-stacks, or time-lapse acquisitions across one or more sample positions. GEM permits user interaction with the system during automation to address unforeseen changes in the sample, save time, and prevent repeat effort.

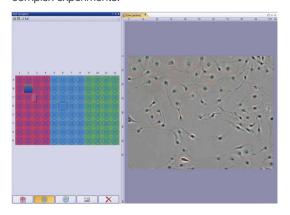


Loop command

#### **Well Plate Navigator**



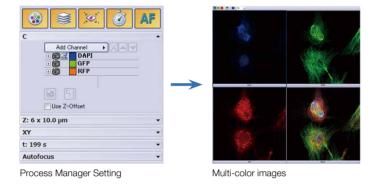
The Well Plate Navigator Solution automatically scans and acquires images from standard and customized well plate formats. All acquired images, sample positions, and user comments can be saved into a structured database for rapid centralized access. Unique imaging settings can be flexibly applied to individual wells, columns, and rows. Additionally, the Well Plate Navigator supports the execution of multiple experiments within a single well plate to support more complex experiments.



#### **Capture Multidimensional Images**

Dimension + Multiposition

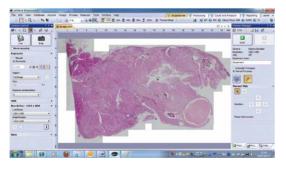
In combination with a motorized microscope, the Process Manager makes it easy to capture multi-colored and multidimensional images. With the optional Multi-position Solution, it is also possible to capture multi-point and large area images automatically.



#### **Panoramic Imaging**



The manual multiple image alignment function creates a single panoramic image as the specimen is scanned. Wide area imaging using a motorized stage can also be fully automated with cellSens Dimension and the optional Multi-position Solution. In combination with a motorized z-focus, this function captures images that are auto-corrected for sample distortion and tilting.



#### **Extended Focus Imaging**



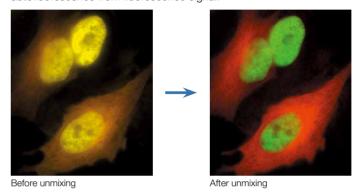
cellSens will create a single in-focus image from successive image planes as the focus knob is turned using the Extended Focus Imaging (EFI) function, or motorized focus drive to fully automated EFI acquisition. EFI composites images can also be created directly from previously captured Z-stacks.

# **Viewing and Processing**

#### Unmixing

#### Dimension

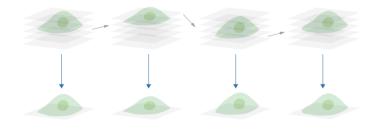
The linear unmixing algorithm in cellSens Dimension results in crosstalk-free fluorescent images to address the challenge of fluorochromes with overlapping emission spectra - such as GFP and YFP. cellSens linear unmixing can also help to separate background autofluorescence from fluorescence signal.



# Best Focus Extraction

## Dimension

Extract the best focus from images, including z-stack, time-lapse images. This function is effective in creating T-series images with the best focus possible, even when working with defocused time-lapse images.



# High Dynamic Range Imaging (HDRI)

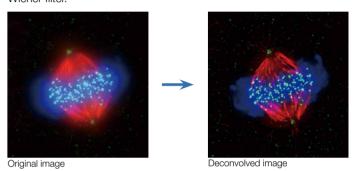
#### Dimensio

By automatically capturing many images at different exposures the HDRI function creates a final image with a much greater dynamic range, where low intensity signals are clearly visible without overexposing the bright areas of the sample.

#### Deconvolution

## Dimension + CI Deconvolution

The optional CI Deconvolution Solution employs the latest in Constrained Iterative Deconvolution algorithms to produce improved resolution, contrast and dynamic range, with industry-leading speed. Each cellSens Dimension license includes Live 2D deblurring for preview and acquisition to enable better contrast within thick specimens. cellSens comes complete with the most widely requested deblurring techniques such as 2D deconvolution, Nearest neighbor, Wiener filter



Cell line: Human cervical cancer cell line HeLa cell

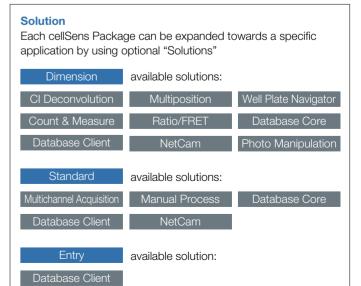
Immunostaining: Hec1 staining (green, Alexa Fluor-488),  $\alpha$ -tubulin staining (red, Alexa Fluor-568), DAPI staining (blue)

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



# An Array of Easy-to-Use Functions Turn Research Finding into Compelling Presentations

# **Measurement and Analysis**

#### **Manual Measurement**

Dimension
Standard

\_

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

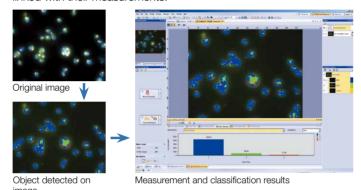




#### **Automatic Object Measurement and Classification**

Dimension + Count & Measure

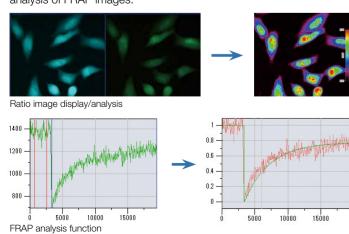
The Count & Measure Solution adds efficient and precise object detection for automated nuclei counting and classification. This solution expands the set of manual measurements in cellSens. Perform automatic object measurement and classification easily, using an interactive interface where recognized objects are always linked with their measurements.



#### **Intensity Analysis**

# Dimension

Graphically depict intensity and channel ratios, and export values to Excel or WorkBook by simply setting the region of interest (ROI). The ROI can be moved to capture measurements in line with cell movements. Convert variations of intensity to hue and brightness using Intensity Modulated Display (IMD) to visually enhance fine image structure often found within ratio or FRET images. The Ratio/FRET Solution is used for analysis and display of real-time ratiometric imaging and data. FRET analysis of both sensitized emission and acceptor photo-bleaching is also supported within this user friendly work-flow. The Photo-Manipulation Solution can be used for the curve-fitting analysis of FRAP images.

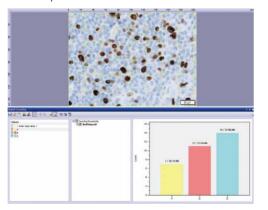


#### **Manual Count**

Dimension

Standard

Perform manual counts with self-set classes. Counts and proportions can then be undertaken for each class through simple mouse operation.

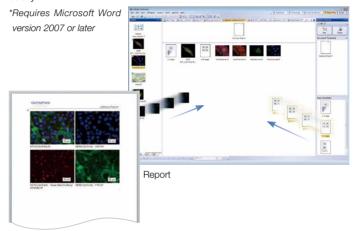


# **Collaboration and Communication**

#### Reporting

#### Dimension

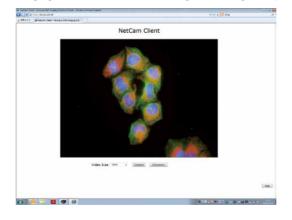
Easily drag-and-drop image property data, measurement data and user-customized fields into a report template using the convenience of a built-in reporting tool to produce Microsoft Word\* format reports. Collaborate with colleagues, and communicate results, quickly and easily.



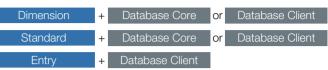
#### Remote Live Image



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



#### **Database**



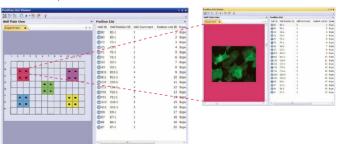
Database Core Solution enables the creation of network shared, user-definable databases, with full access controls. The database stores images and all associated image properties, user comments and any other related files that a user wishes to include. The interactive query tool makes it easy to find the data, and provides automatic previews of each queried image. Read and write to a shared database conveniently from multiple different stations with the Database Client Solution.



#### **Database+well Navigator**



In combination with the Well Navigator Solution, the Database Solution greatly improves the efficiency of viewing and analysis of 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 allows viewing of captured images and continuous analysis of selected images (the Batch Macro function) via the well plate GUI.



10