

GE Healthcare
Life Sciences



DeltaVision OMX™

with the Blaze™ SIM Module

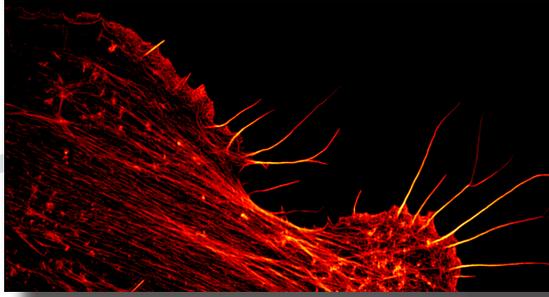


Super-resolution imaging with

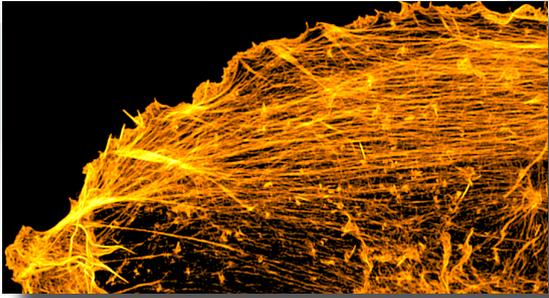
DeltaVision OMX™

with the Blaze™ SIM Module

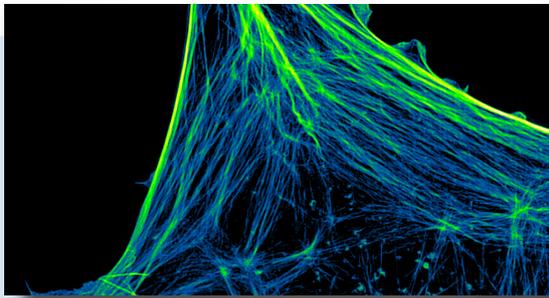




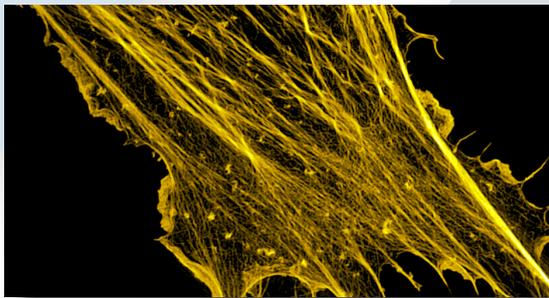
Excellent Visibility



Unimaginable Clarity



Incredible Speed



Immense Possibilities

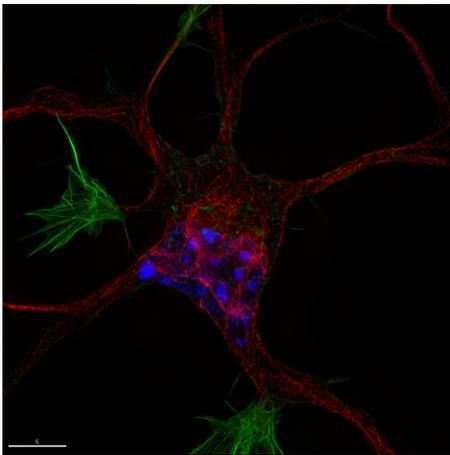
See More. Understand More. Discover More.

DeltaVision OMX

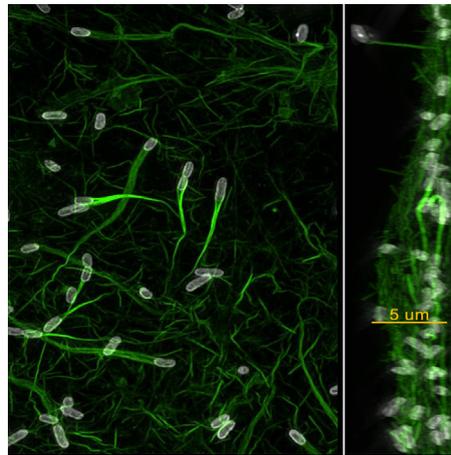
System overview

The DeltaVision OMX imaging platform is an advanced multi-mode, super-resolution microscope system representing the next generation of microscopy evolution. DeltaVision OMX offers super-resolution imaging using 3D structured illumination (3D-SIM) as well as super fast widefield acquisition.

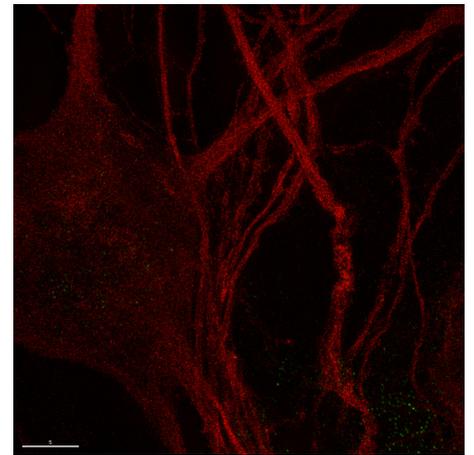
The innovative Blaze SIM Module offers dynamic high speed 3D-SIM, which has made LIVE cell super-resolution imaging a reality. Blaze incorporates a proprietary, ultra-fast, structured illumination module, advanced optical platform design and the latest high-speed camera technologies delivering increases in both temporal and spatial resolution within dynamic living samples.



Hippocampal neurons - Image courtesy of Erik Dent, University of Wisconsin Madison



R. parkeri infected Cos7 cells - Image courtesy of Matt Welch, University of California at Berkeley



Hippocampal neurons - Image courtesy of Xinran Liu, University of Texas Southwestern Medical Center



What is super-resolution imaging?

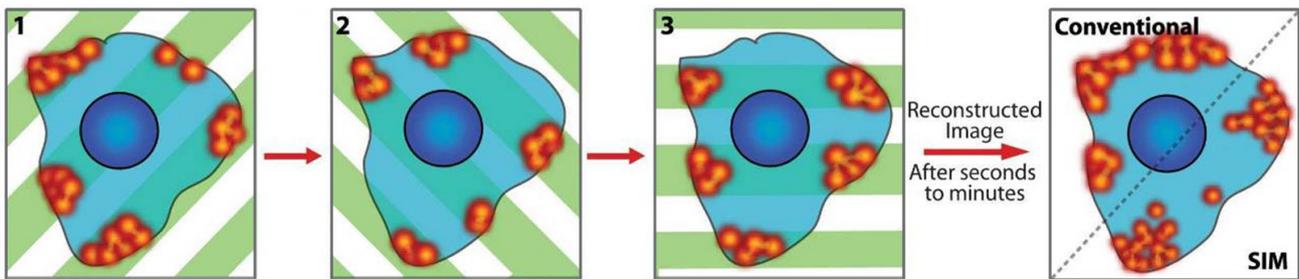
In recent years a variety of new approaches such as Structured Illumination Microscopy (SIM), Localization Microscopy and Stimulated Emission Depletion (STED) have been developed to surpass the limits of conventional optical microscopes. Collectively referred to as super-resolution microscopy, these methods allow precise visualization and measurement of features that are below the diffraction limit.

3D-SIM projects a structured light pattern onto the sample. The illumination pattern interacts with the fluorescent probes in the sample to generate interference patterns known as moiré fringes. By modulating the illumination pattern, collecting and reconstructing the subsequent images, super-resolution images with double the lateral and axial resolution are obtained.

3D-SIM techniques work with traditional fluorescent proteins and dyes commonly used in much of fluorescent imaging. In addition, 3D-SIM imaging is not limited to regions of interest at the coverslip and can image up to 10 microns past the coverslip into the sample.

Localization microscopy identifies the position of individual fluorophores by imaging a few at a time using photoactivable or photoswitchable fluorophores. When only a single fluorophore is emitting light, the precise position of that fluorophore can be determined by fitting a Gaussian curve to the spot and assigning the peak of that curve to represent the location.

Challenges arise when multiple fluorophores are too closely positioned such that images overlap and single molecules can no longer be resolved. Commercially available Localization Microscopy methods are implemented in Total Internal Reflection Fluorescence (TIRF) microscopy mode and rely on the use of either specialized dye pairs or photoswitchable fluorescent proteins.



Three Dimensional Structured Illumination Microscopy (3D-SIM)

The DeltaVision OMX with the Blaze SIM Module utilizes 3D-SIM for super-resolution imaging. Use of the system can lead to a deeper understanding about complex cellular mechanisms, structures and interactions.

Simply put, it can help you see more, understand more and discover more.

Feature highlights

Specially designed optical system

- Multiple laser options support a wide range of fluorescent dyes and proteins
- EM-CCD or sCMOS camera options available for sensitivity and speed optimization
- Self-contained, HEPA-filtered enclosure eliminates the need for a dedicated darkroom

High-speed widefield imaging mode

- Simultaneously acquires up to four wavelengths - critical for high-speed live cell and Fluorescence Resonance Energy Transfer (FRET) imaging
- Multiplex imaging derives more data from each sample
- Proprietary softWoRx™ software features quantitative deconvolution capabilities

Super-resolution imaging

- True 3D structured illumination imaging enables resolution improvements in X, Y and Z
- 120 nm in XY and 300 nm in Z (resolution is wavelength and optics dependent)

Blaze SIM module

- Groundbreaking ~1 sec/micron 3D-SIM allows for live cell 3D super-resolution imaging
- Ultra-fast widefield imaging at >400 fps depending on exposure time

Multi-line and Ring TIRF illumination

- Exclusive Multi-line TIRF illumination optimized for each excitation wavelength for easy excitation switching
- Ring TIRF removes interference fringes and allows fast multi-angle illumination to automatically correct for chromatic differences
- Simultaneous photoactivation and sample imaging for fast photokinetic applications (e.g. caged-calcium release or PA-GFP activation)



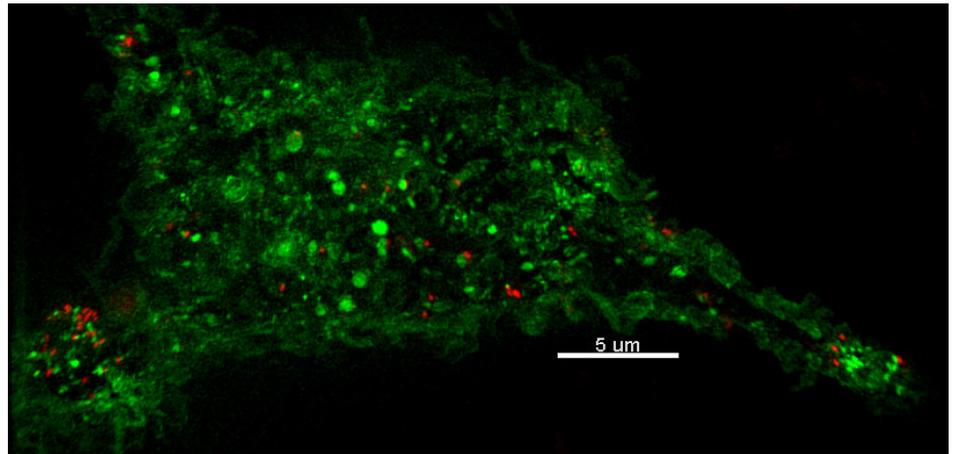
DeltaVision OMX®

3D-SIM with the DeltaVision OMX

The structured light pattern creates interference moiré patterns with the fine structures of the sample which are captured in the resulting fluorescence images. The sample is imaged using several different orientations and phases of the light pattern. Proprietary computer algorithms process the data set and generate the final super-resolution image.

3D-SIM reconstructed images

- Yield twice the resolution of conventional imaging techniques in X, Y and Z
- Provide an overall eight-fold improvement in volume resolution (X, Y and Z)
- Can be collected with conventional fluorophores and sample preparation techniques



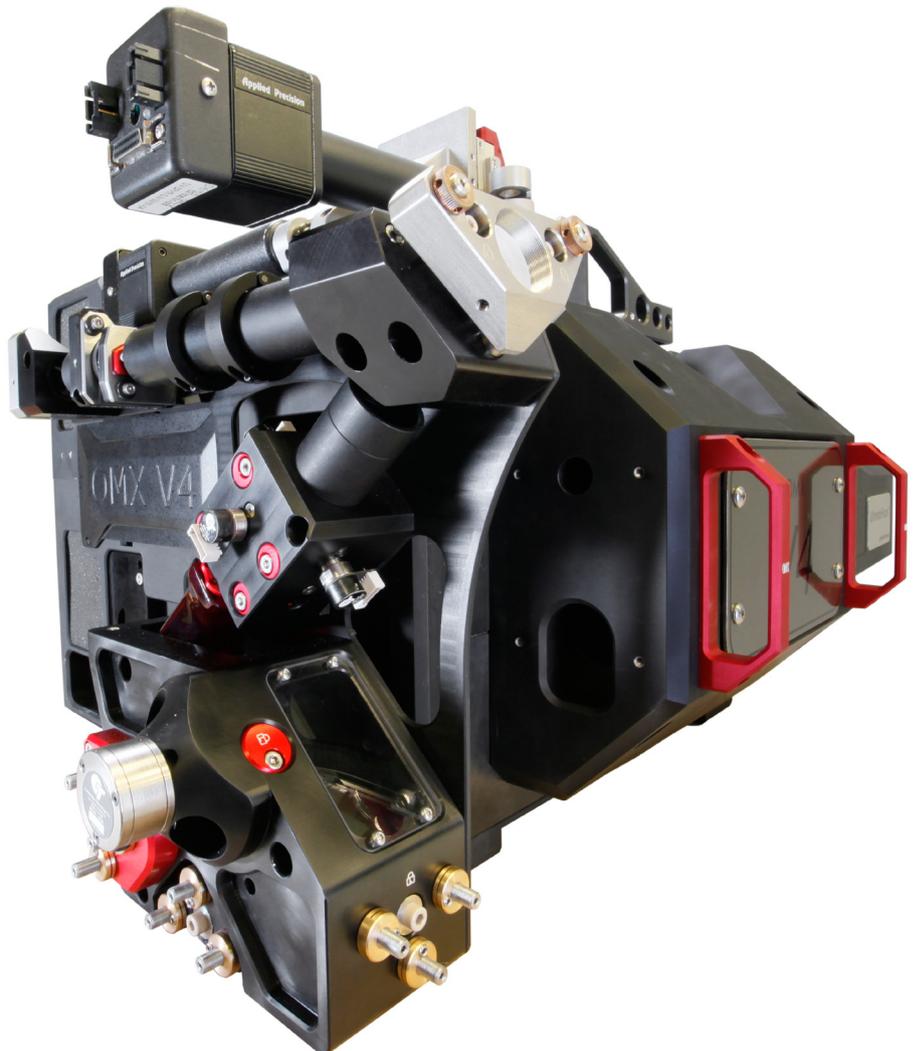
Macrophage cell (RAW) with 100 nm glass beads (red dots) - Image courtesy of Cynthia Whitchurch and Lynne Turnbull, Microbial Imaging Facility, University of Technology, Sydney

Flexible configurations

The DeltaVision OMX system is based on our exclusive platform which is a highly flexible system capable of multiple imaging modes, such as widefield, time-lapse imaging, deconvolution or TIRF illumination. The capabilities of the DeltaVision OMX are expandable.

Multi-mode imaging capabilities

- 3D-structured illumination, super-resolution imaging
- Conventional fluorescence imaging with high speed solid state illuminator
- Optional multiline TIRF illumination light path
- Supports up to four custom liquid cooled sCMOS or EMCCD cameras for simultaneous multichannel imaging



DeltaVision OMX system configuration

Overview	3D-SIM super-resolution imaging
Lateral resolution ¹	120 nm
Axial resolution ¹	300 nm
Acquisition speed 3D-SIM ²	1.5 sec per 1 um stack
Standard camera/filter setup	1 camera + filter wheel
Additional cameras ³	Optional, 4 max
Lasers options	405 nm, 445 nm, 488 nm, 514 nm, 568 nm, 642 nm
Conventional illumination	6 color InsightSSI™ illuminator with 405, 445, 488, 514, 568, 642 nm excitation wavelengths
3D-SIM illumination	Yes
Ring TIRF illumination	Optional
Optional accessories	DIC option, live cell heating kit

¹ Actual resolution is dependent on wavelength and optical configuration – values quoted for 488 nm excitation

² Acquisition speed is for a 1 um stack of 135 images with 1 ms exposures

³ Additional cameras also require new filter which are included in camera package

Resolution comparisons

	Widefield microscopy	Widefield deconvolution	3D-SIM
Lateral X, Y ¹	320 nm	250 nm	120 nm
Axial Z ¹	600 nm	500 nm	300 nm
Imaging speed	> 400 fps	> 400 fps raw acquisition	120 fps raw acquisition speed effective 1 um/sec 3D-SIM
Applications	live imaging fast live imaging fixed tissue imaging	live imaging fast live imaging fixed tissue imaging	live cell super-resolution imaging fixed tissue imaging

¹ Actual resolution is dependent on wavelength and optical configuration – values quoted for 488 nm excitation

For local office contact information, visit
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