



DeltaVision™ Elite Cell Imaging System



www.gelifesciences.com/deltavision

The DeltaVision difference

The DeltaVision imaging system is a fully integrated, turnkey, deconvolution microscope system optimized for low light and live cell imaging applications. We continue to advance the performance and utility of the system to provide high quality image data for cellular imaging applications.

The benefits and improvements of the current DeltaVision Elite Imaging System over the previous generation DeltaVision Core system are presented. Additionally, advantages of the enhanced features and offerings, such as, 6 lasers, an environmental control system, improved staging, are compared to a basic core system without such capabilities.

The DeltaVision Elite Imaging System

The DeltaVision Elite is designed for maximum flexibility for fluorescent imaging applications, including time-lapse live cell imaging, Total Internal Reflection Fluorescence (TIRF), Fluorescence Resonance Energy Transfer (FRET), photokinetics and Differential Interference Contrast (DIC).

- Designed and optimized for low light imaging and to leverage the power of deconvolution
- Attention to the details that matter to maximize imaging performance
- Easy multi-dimension experimental setup and acquisition
- Fully integrated system for seamless operation and upgradeability



Drosophila optic stalk stained for glial cells (green), axons (red) and DNA (blue) - Image courtesy of Mriga Das, University Of British Columbia, Canada

The TruLight Illumination System

The illumination system is the heart of every microscope and critical to system performance. We have the TruLight Illumination System, a design for the DeltaVision fluorescence illumination path that consists of four key elements:

→ Excitation

Powerful solid state illumination and ultrafast wavelength switching

→ Automation

Seamless switching between viewing and imaging modes for excellent image quality

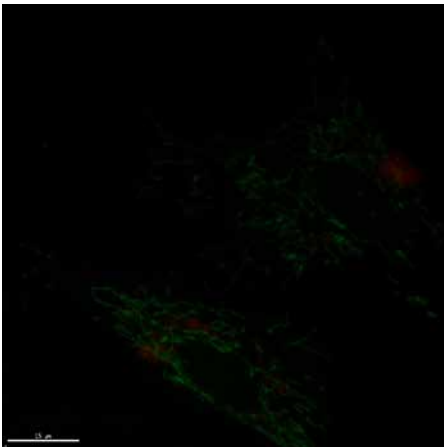
→ Concentration

Optimized transmission, increasing light to sample by five times

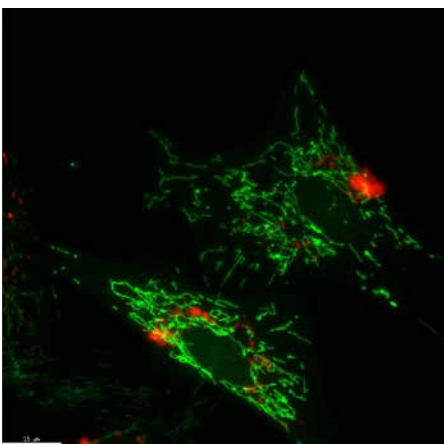
→ Application

Expanded options, including Multi-line TIRF and quantitative photokinetics

TruLight delivers exceptional signal-to-noise performance and five times more light to the sample compared to our previous illuminator assembly. This enables detection of small, dim objects such as organelles and microbial particles. TruLight supports a vast range of optional hardware to enhance system functionality, including UltimateFocus and Multi-line TIRF.



Standard Illumination



DeltaVision Elite with TruLight Illumination



TruLight Illumination assembly showing UltimateFocus module and widefield illumination assembly.



InsightSSI illumination module

DeltaVision imaging

Illumination

InsightSSI Solid State Illumination

The InsightSSI illumination module incorporates novel light source technologies for excellent performance and operational lifetime.

- Exceptionally stable and long lasting illumination
- Electronic control with instant on/off operation
- Microsecond switching between wavelengths

UltimateFocus

UltimateFocus automatically maintains the sample z-position regardless of mechanical or thermal changes that can impact your experiment.

- Innovative, patent-pending design
- Real-time compensation of stage drift
- Focus control within 50 nm

Now with Focus Assist which guides the user to bring the objective into the area of focus without exposing the sample to excitation light. This minimizes photodamage to the sample which can be critical for live cell imaging applications.

Uniform Illumination

Every DeltaVision system utilizes our proprietary photosensor correction system.

- Continuously measures the excitation light output to ensure data integrity
- Provides automatic image correction for intensity fluctuations as required for quantitative imaging

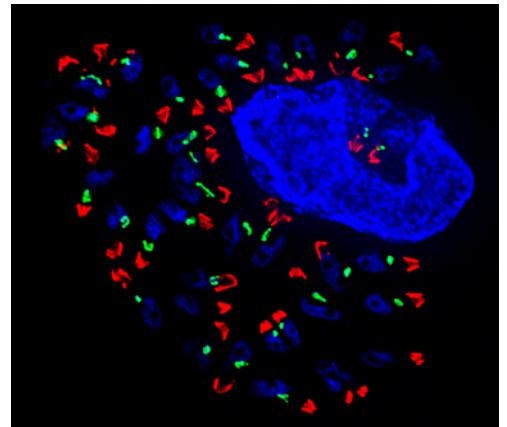
Attention to detail and refinement

Every aspect of the light delivery to the sample and collection of the signal to the camera has been refined and optimized. The result is exceptional image quality resulting in remarkable data.

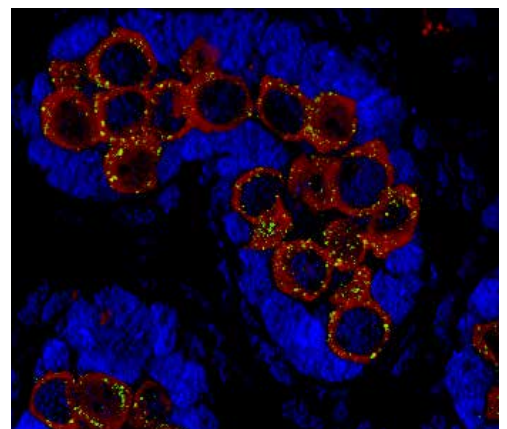
- Hand selected and validated objective lenses for maximal performance and quality
- Spherical aberration correction through immersion media index matching
- Automated switching of light path to optimize signal to background during imaging mode



Drosophila ovary - Image collected during In Situ Hybridization Course, Cold Spring Harbor Laboratory.



Toxoplasma gondii parasite in a HFF cell stained for the apicoplast organelle (green), ISP1 protein (red) and DNA (blue) - Image courtesy of Muthugapatti Kandasamy, University Of Georgia, USA



Section of embryonic testis stained for MILI (green), Mvh(red), and Gata4 - Image courtesy of Yueh-Chiang Hu, MIT Cambridge, USA

Laser module

X4 Laser Module

The X4 Laser Module combines up to four lasers that are active simultaneously for increased performance. The increased laser line selection allows the user flexibility when selecting fluorescent dyes and proteins.

- Six lasers to choose from for TIRF and PK applications allow greater flexibility in the use of fluorescent dyes and proteins.
- Higher power laser options for Localization Microscopy applications at 488 nm and 568 nm wavelengths
- Rapid laser switching enables combinations of multiple lasers to photoactivate and photobleach the sample within the same experiment.

Multi-line TIRF

Total Internal Reflection Fluorescence (TIRF) microscopy is a specialized technique used to image samples within 100-150 nm of the coverslip surface. However light penetration is dependent upon wavelength. The DeltaVision TIRF module has solved this limitation by automating several key components to bring the lasers to the same focal plane.

- Performs chromatic correction of each wavelength to the same penetration depth at the coverslip
- Enables super-resolution imaging with the DeltaVision Localization option
- Flexible experiment design enables the combination of photokinetic applications (e.g. PA-GFP) with TIRF imaging

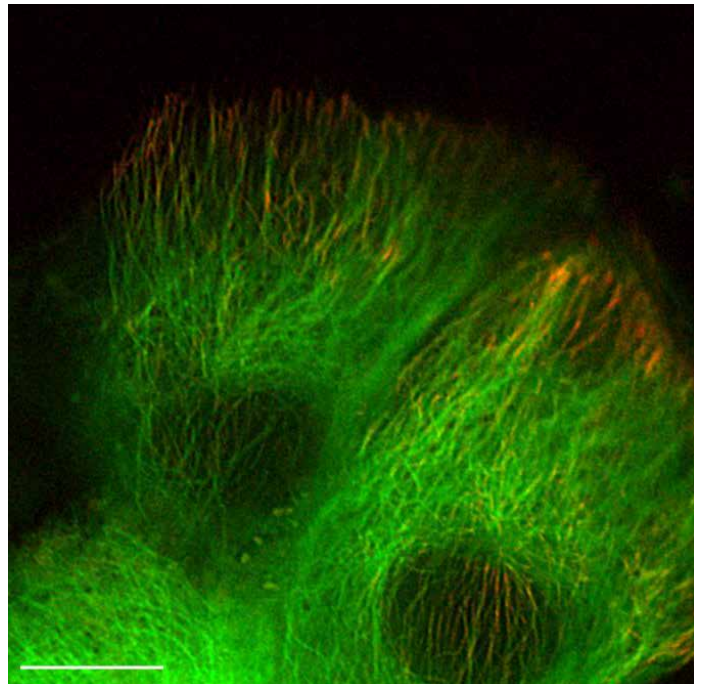


Trulight illumination assembly shown with optional TIRF/PK module

Photoactivation/Photokinetics/FRAP/FLIP

Photoactivable and photoconvertible fluorophores give the user the ability to manipulate the sample or its environment in a non-invasive manner. The sub-diffraction limited spot size generated through the optional PK optics module enables photoactivation or conversion with pinpoint precision.

- **Photoactivation** to initiate fluorescence of a dye or protein to act as a marker within a larger population
- **Photokinetics** to precisely calculate the rate and direction of movement of the fluorophore of interest
- **Fluorescence Recovery After Photobleaching (FRAP)** to photobleach a region of interest and measure the recovery of fluorescence in the bleached area
- **Förster/Fluorescence Resonance Energy Transfer (FRET)** to characterize the interactions of proteins that are known to associate with each other



Epifluorescent (green) and TIRF (red) images of Zyxin:GFP localized to focal adhesions in HeLa cells

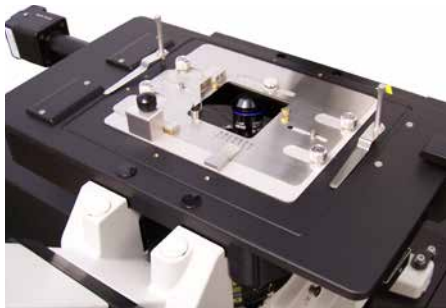
DeltaVision innovation

Stage and environment

Flexure stage

Our patented Flexure stages and NanoMotion III Precision Control motors ensure precise stage movement and stability.

- Tremendous accuracy and repeatability over the system's full range of motion
- Excellent repeatability for multiple point sample during time-lapse experiments



Patented Flexure stage

Microtiter stage

The microtiter stage is designed to accommodate 96- and 384-well microtiter plates.

- User-friendly software collects and reviews multiple fields of view in every well
- Preset imaging patterns easily and efficiently tackle large imaging assays
- Streamline labor-intensive tasks such as quantitating signal transduction, measuring drug efficacy or optimizing antibody titrations



Optional microtiter stage

Environmental control

Precision environmental control is critical for long term imaging experiments. DeltaVision Elite can provide stringent heat and CO₂ controls:

- Provide improved sample viability and physiology
- Decrease phototoxic stress on cells
- Minimize thermal shifts and isolate system from surrounding environment temperature instability



Optional environmental control chamber available in either clear (left) or opaque (right)

Stage specifications

Conventional imaging mode

Accuracy	< 10.0 μm per 25 mm (X,Y) < 0.6 μm per 13 μm (Z)
Repeatability	< ± 0.2 μm (X,Y) < ± 0.1 μm (Z)
Step resolution	20 nm (X,Y) 5 nm (Z)
Maximum travel	25 mm (X) x 50 mm (Y) 1 mm (Z)
Automation control	3D multi-site visiting within a sample

Microtiter plate mode

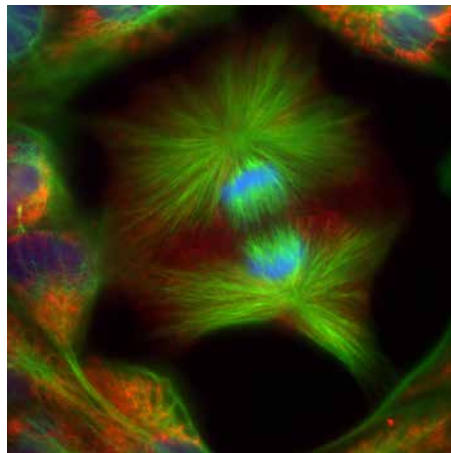
Accuracy	< 10.0 μm per 25 mm (X,Y) < 0.6 μm per 13 μm (Z)
Repeatability	< ± 0.2 μm (X,Y) < ± 0.1 μm (Z)
Step resolution	20 nm (X,Y) 5 nm (Z)
Maximum travel	106 mm (X) x 70 mm (Y) 1 mm (Z)
Automation control	3D multi-site visiting within well(s)

System Features

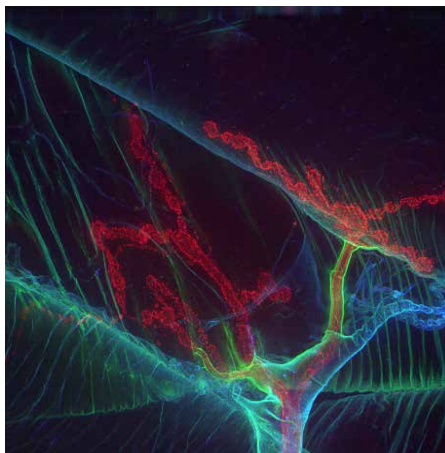
Deconvolution

Deconvolution improves contrast and resolution compared to raw data images without sacrificing data integrity. The DeltaVision Elite system is designed to optimize data collection for our deconvolution algorithm yielding truly quantitative data.

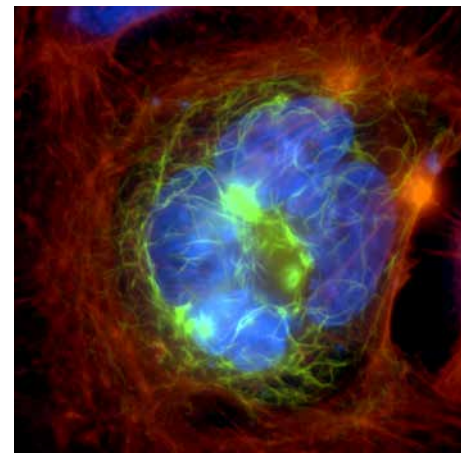
- Increases image resolution in x, y and z axes
- Deconvolve images on-the-fly
- Hardware and software designed to work together for the optimal data output



BSC1 cells - Image collected during AQLM, Marine Biological Laboratory, Woods Hole, MA



Drosophila neuromuscular junction stained for extracellular matrix proteins (green and blue) and the nerve terminal (red) - Image courtesy of Vanessa Auld, Univ Of British Columbia, Canada



Cell expressing a TRIM5alpha-GFP fusion protein (green) stained for actin (red) and DNA (blue) - Image courtesy of Ed Campbell, Loyola University, USA

Cell tracking

Cell tracking function automatically repositions the stage to accurately follow cells as they move during time-lapse experiments

- Defines one cell of interest to track within a large population
- Keeps cell(s) in center of the field-of-view
- Uses collected data to calculate rates and direction of motion

Point-visiting

Our exclusive NanoMotion III technology enables the user to accurately and repeatably visit a series of points within a single or time-lapse experiment. This technology ensures that the stage will return to the exact location in x, y and z.

- Provides exceptional point-to-point accuracy and precision motion control
- Programs and stores hundreds of points to maximize data collection within an experiment
- Images can be processed through automated analysis during acquisition to reduce post-processing time

Optical Axis Integration (OAI)

OAI is an approach for rapidly acquiring data in the z axis based on user defined ranges. It quickly captures volume data thus minimizing photodamage and bleaching in critical samples

- Images moving diffraction-limited objects that may otherwise be lost between frames
- Lowers total light exposure to sample by minimizing images acquired compared to stack acquisition
- Rapidly captures the total number of objects within a cell (e.g., centrosomes, viral particles)

We are committed to supporting our customers through upgrade solutions and service contract options to ensure every DeltaVision system remains an indispensable imaging platform for life science research both now and in the future.



www.gelifesciences.com/deltavision

GE and GE monogram are trademarks of General Electric Company. DeltaVision is a trademark of General Electric Company or one of its subsidiaries. DeltaVision Elite imaging systems are for research use only not for use in diagnostic procedures.

©2012–2014 General Electric Company—All rights reserved. First published Oct. 2012.

All goods and services are sold subject to the terms and conditions of sale of the company within GE Healthcare which supplies them.

A copy of these terms and conditions is available on request. Contact your local GE Healthcare representative for the most current information.

GE Healthcare UK Limited, Amersham Place, Little Chalfont, Buckinghamshire, HP7 9NA, UK.

GE Healthcare Bio-Sciences AB, Björgatan 30, 751 84 Uppsala, Sweden

GE Healthcare Europe, GmbH, Munzinger Strasse 5, D79111 Freiburg, Germany

GE Healthcare Bio-Sciences Corp., 800 Centennial Ave., P.O. Box 1327, Piscataway, NJ 08855-1327 USA

GE Healthcare Japan Corporation, Sanken Bldg., 3-25-1, Hyakunincho, Shinjuku-ku, Tokyo 169-0073, Japan

29-0417-06 AC 10/2014