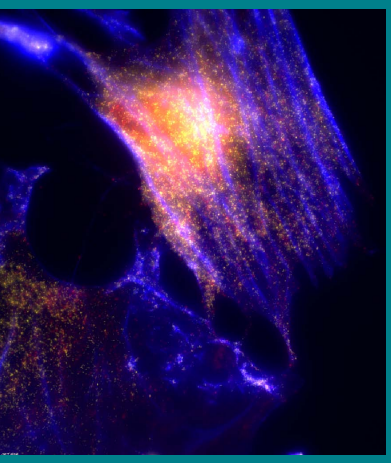
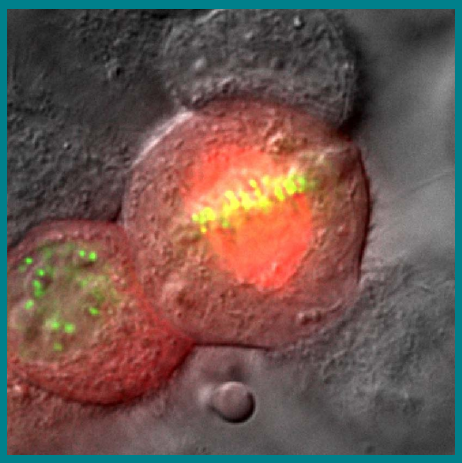
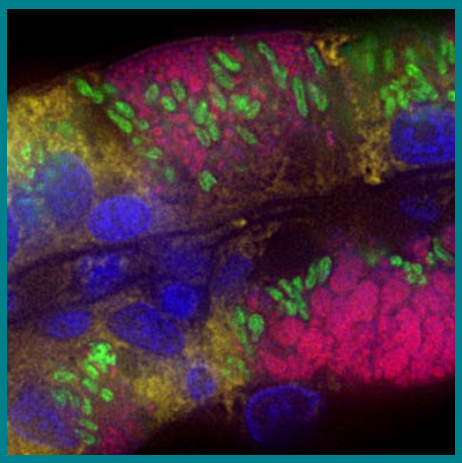
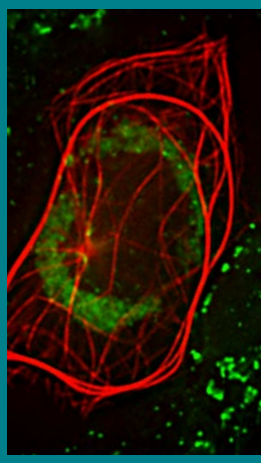
applied precision

A GE Healthcare Company

The DV Elite™ Imaging System

The DeltaVision Difference

Dedicated to pushing the limits of imaging and microscopy, in 1994 Applied Precision introduced a novel concept — the first fully integrated, turn-key deconvolution imaging system. Our commitment to innovation, quality, performance and upgradeability marked the beginning of the **DeltaVision Difference**.

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

The DV Elite™ Imaging System

The DV Elite is the newest edition to the DeltaVision family of advanced microscopy imaging systems from Applied Precision. The DV Elite is designed for maximum flexibility and can handle most applications including time-lapse live cell imaging, TIRF, FRET, Photokinetics and DIC.

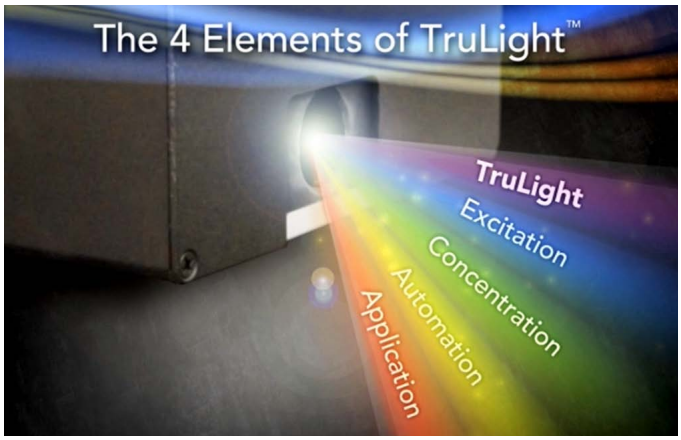
- Maximum flexibility for all your imaging needs
- Revolutionary live cell imaging performance
- Outstanding focus stability for long term imaging experiments
- Fully integrated system for seamless operation and upgradeability

DV Elite shown with Advanced Isolation Table

DV Elite

The TruLight™ Illumination System

The illumination system is the heart of every microscope and critical to system performance. Applied Precision recognizes this and has developed the TruLight Illumination System, a radical new design for the DeltaVision fluorescence illumination path that consists of four key elements:

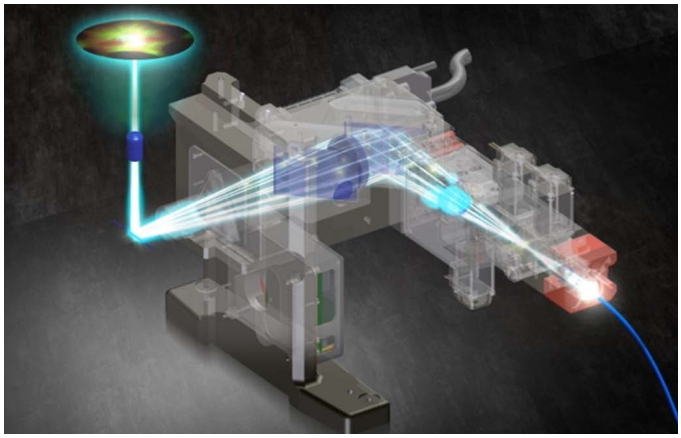


Excitation — Powerful solid state illumination and ultrafast wavelength switching

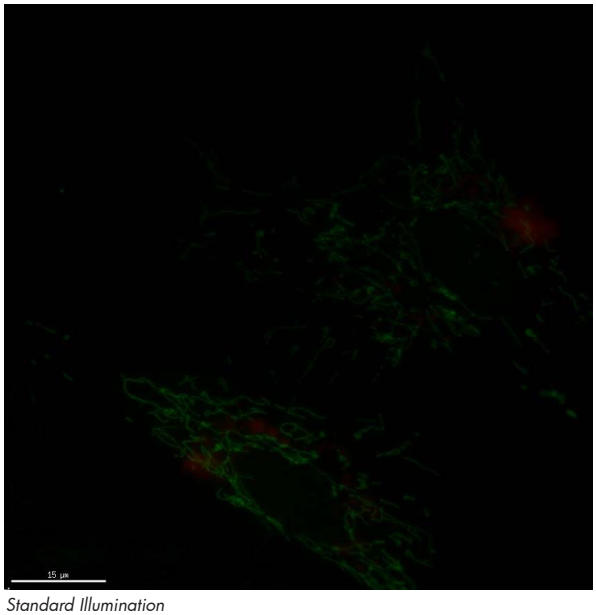
Concentration — Optimized transmission increases light to sample by 5 times

Automation — Seamless switching between viewing and imaging modes for superior image quality

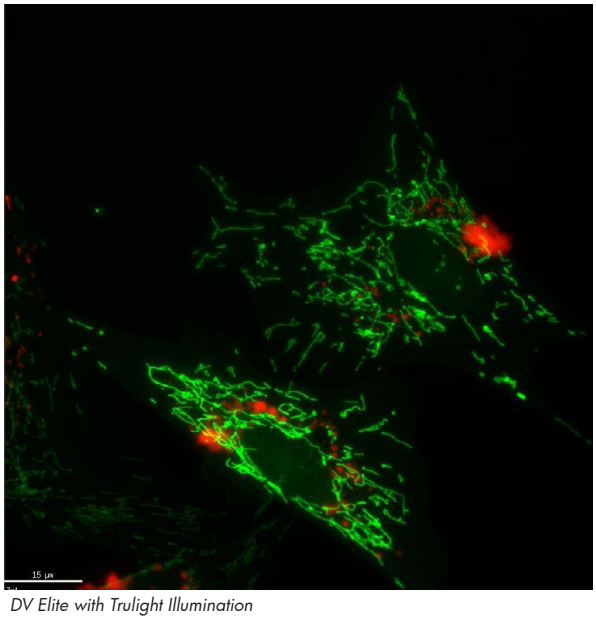
Application — Expanded options, including Multi-line TIRF and quantitative photokinetics



TruLight delivers outstanding signal to noise performance and 5 times more light to the sample, enabling detection of small, dim objects such as organelles and microbial particles. TruLight supports a vast range of options to enhance system performance, including *UltimateFocus™* and Multi-line TIRF.

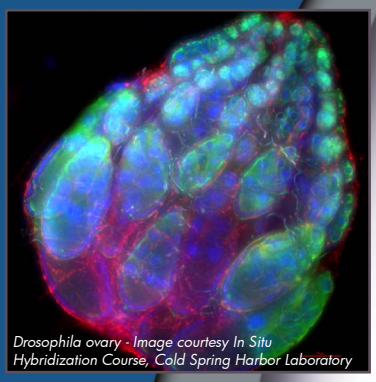


Standard Illumination

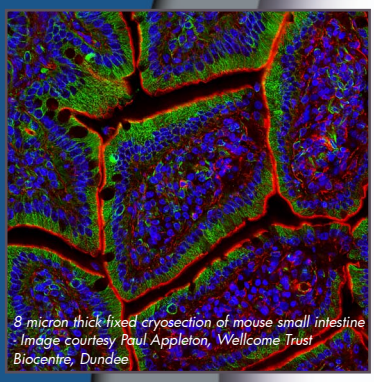


DV Elite with Trulight Illumination

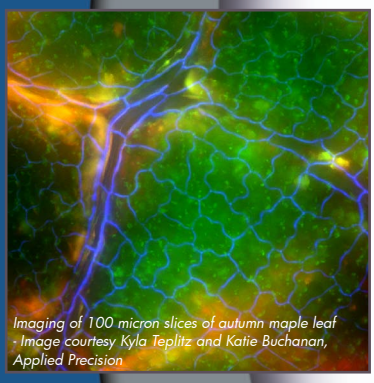
DeltaVision Imaging



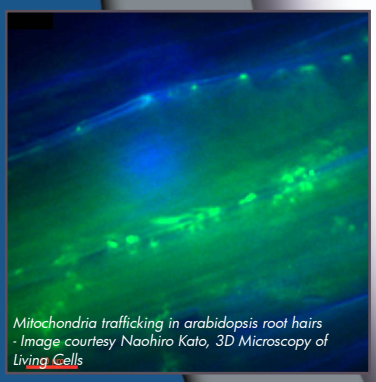
Drosophila ovary - Image courtesy In Situ Hybridization Course, Cold Spring Harbor Laboratory



8 micron thick fixed cryosection of mouse small intestine - Image courtesy Paul Appleton, Wellcome Trust Biocentre, Dundee



Imaging of 100 micron slices of autumn maple leaf - Image courtesy Kyla Teplitz and Katie Buchanan, Applied Precision



Mitochondria trafficking in arabidopsis root hairs - Image courtesy Naohiro Kato, 3D Microscopy of Living Cells

Illumination

InsightSSI™ Solid State Illumination

The *InsightSSI* illumination module incorporates novel light source technologies for optimal performance.

- Extremely stable and long lasting illumination
- Electronic control provides 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.

- Exclusive, patent-pending design
- Real-time compensation of stage drift
- Focus control within 25 nm

Now with Focus Assist! The Focus Assist feedback loop of *UltimateFocus* determines the distance between the objective and the coverslip. It guides the user to bring the objective into the area of focus without using the eyepieces or a camera.

Illumination Uniformity

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

Differential Interference Contrast (DIC)

DIC light microscopy produces finely detailed high contrast images to rapidly visualize the state of the cell. DIC combined with epifluorescence provides more information within context of the sample.

- Quickly identifies healthy cells within a large population
- Establishes focal plane to minimize photodamage to cells
- Monitors cell viability during time-lapse experiments

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 greater flexibility in the use of fluorescent dyes and proteins.

- More powerful lasers for shorter exposure times increase the accuracy of photokinetic measurements
- Specialized optics generate a near diffraction-limited spot size to target a measurable region of interest
- Rapid laser switching enables combinations of multiple lasers to photoactivate and photobleach the sample within the same experiment

Multi-Line TIRF

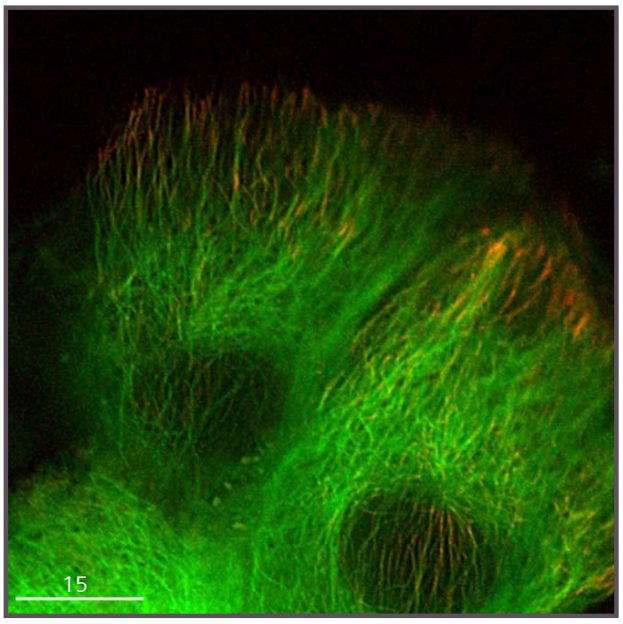
Total Internal Reflection Fluorescence (TIRF) microscopy is a specialized technique used to image samples within 100-200 nm of the coverslip surface. Because light travels different distances, the challenge of TIRF is to ensure that all laser lines penetrate the sample to the same depth. Applied Precision 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
- Increases imaging options using four lasers in our new *X4* Laser Module
- Flexible experiment design enables the combination of photokinetic applications (PA-GFP) with TIRF imaging

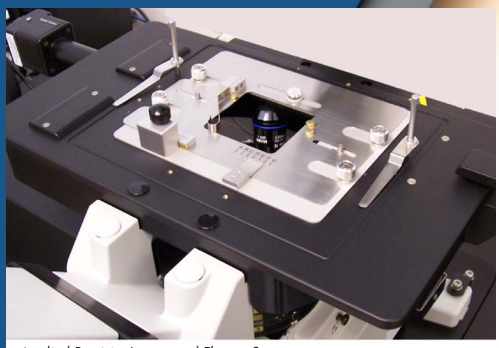
Photoactivation/Photokinetics/FRAP/FLIP

Photoactivable and photoconvertible proteins give the user the ability to take a more active role in expanding the type of data collected. The sub-diffraction limited spot size of the *X4* Laser Module enables exquisite control over the target area for quantitative results.

- **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



Applied Precision's patented Flexure Stage

Optional Microtiter Stage

Optional Environmental Control Chamber available in clear (shown) and opaque

Stage and Environment

Flexure Stage

Applied Precision's patented Flexure Stages and exclusive NanoMotion III Precision Control motors ensure precise stage movement and stability.

- Industry leading accuracy and repeatability over its full range of motion
- Superior repeatability for multiple point sample during time-lapse experiments

Microtiter Stage

The Applied Precision Microtiter Stage is designed to accommodate 96- and 384-well microtiter plates and increases the flexibility of any DeltaVision system.

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

Environmental Control

Precision environmental control is critical for long term imaging experiments. Stringent heat and CO_2 controls:

- Duplicate incubator conditions
- Decrease phototoxic stress on cells
- Minimize thermal shifts for superior image quality

Stage Specifications

Conventional Imaging Mode		Microtiter Plate Mode	
Absolute Accuracy	< 10.0 um per 25 mm (X,Y) < 0.6 um per 13 um (Z)	Absolute Accuracy	< 10.0 um per 25 mm (X,Y) < 0.6 um per 13 um (Z)
Repeatability	< ± 0.2 um (X,Y) < ± 0.1 um (Z)	Repeatability	< ± 0.2 um (X,Y) < ± 0.1 um (Z)
Step Resolution	20 nm (X,Y) 5 nm (Z)	Step Resolution	20 nm (X,Y) 5 nm (Z)
Maximum Travel	25 mm (X) x 50 mm (Y) 1 mm (Z)	Maximum Travel	106 mm (X) x 70 mm (Y) 1 mm (Z)
Automation Control	3D multisite visiting within a sample	Automation Control	3D with multisite visiting within well(s)

DELTAVISION INNOVATION

Deconvolution

Deconvolution improves image resolution and contrast without sacrificing data integrity. The Applied Precision exclusive deconvolution algorithm results in true quantitative data.

- Increased resolution in x, y and z axes
- Deconvolve images on-the-fly to visualize data faster
- Designed to be the best deconvolution system available

Point-Visiting

The Applied Precision exclusive NanoMotion III technology enables the user to 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 unmatched point-to-point accuracy and precision motion control
- Programs and stores hundreds of points to maximize data collection within an experiment
- Streams collected data to image processing tasks to improve workflow

Cell Tracking

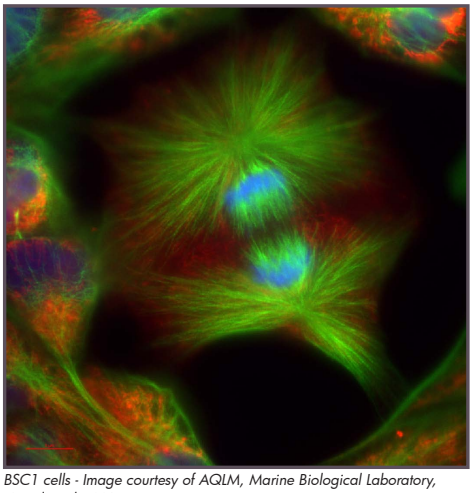
Cell tracking algorithms automatically reposition the stage to follow cells as they move.

- Accurately tracks cells during long time-lapse experiments
- Defines one cell of interest to track within a large population
- Uses collected data to calculate rates and direction of motion

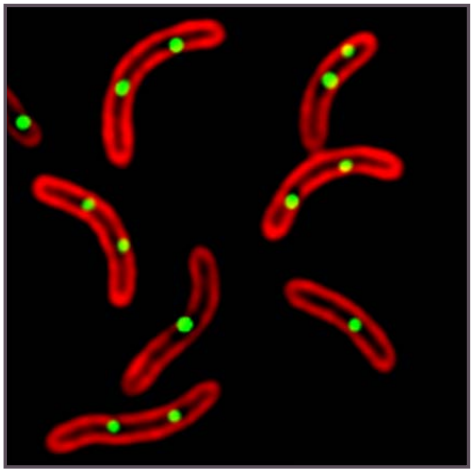
Optical Axis Integration (OAI)

OAI is an approach for rapidly acquiring data in the z axis based on user defined ranges. It quickly captures and visualizes data that otherwise may be missed.

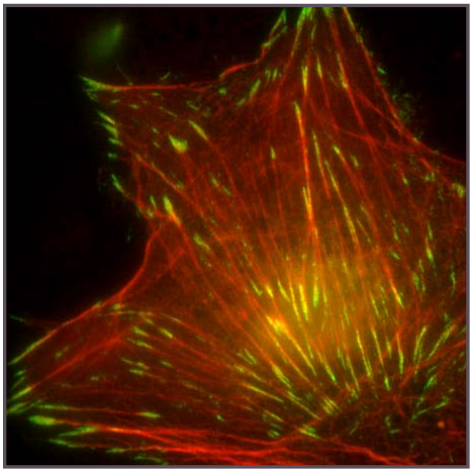
- Images moving diffraction-limited objects that may otherwise be lost between frames
- Lowers total light exposure, increasing cell viability
- Rapidly captures the total number of objects within a cell (e.g., centrosomes, viral particles)



BSC1 cells - Image courtesy of AQLM, Marine Biological Laboratory, Woods Hole, MA



GFP tagged plasmid RK2 in Vibrio cholerae - Image courtesy of T. Ho, Z. Zhong, S. Aung, and J. Pogliano



Porcine aortic endothelial cells - Image courtesy Ronen Zaidel-Bar, Weizmann Institute of Science, Rehovot, Israel

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