

High Quality Imaging.  
High Quality Components.

Cytation™ Imaging Readers

See Possible.

Cytation™ unites BioTek's microplate instrumentation expertise with components from leading imaging experts. This combination provides unsurpassed workflow efficiency and a truly unique live cell assay solution.

Dual Reagent Dispenser



LED Cubes and Filter Cubes with Semrock Filters



Olympus and Zeiss Objectives



Gas Controller Module



Cytation 5 and BioStack Microplate Stacker



Think Possible

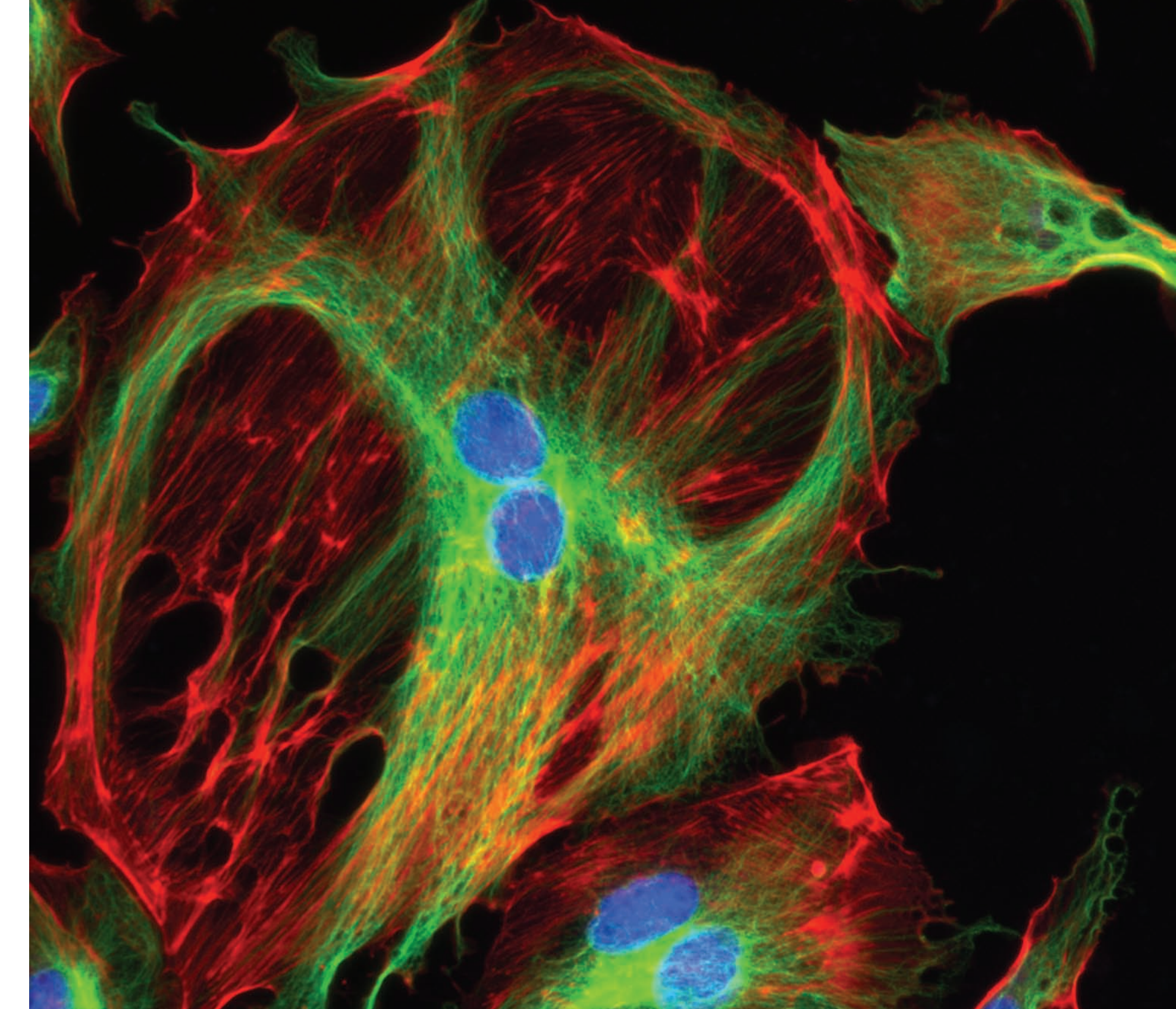
**BioTek**

At BioTek, our philosophy transcends conventional thinking and challenges the old ways. We develop fresh, original solutions by unifying concepts that often appear to be opposed. It means to shape and reshape. To engineer, build, deliver and support products that *best* serve the marketplace by providing *what* you need, *when* you need it.

**Think Possible.** It's the difference between leading and following.

Think Possible

**BioTek**



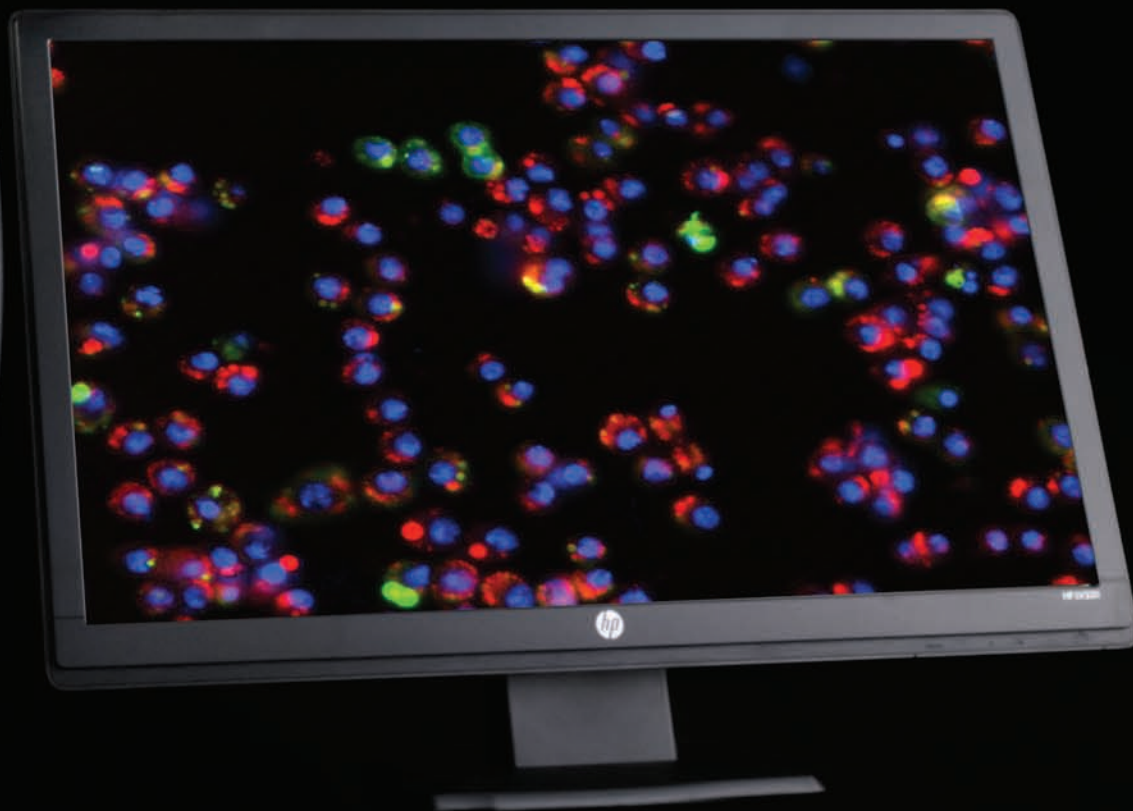
Cytation™ imaging multi-mode readers combine automated digital microscopy with conventional multi-mode microplate detection, providing both phenotypic cellular information and well-based quantitative data. Equipped with BioTek's patented Hybrid Technology™, Cytation includes variable bandwidth monochromators and high sensitivity filter-based detection for unmatched versatility and performance. The microscopy module provides cellular visualization up to 60x magnification in fluorescence, brightfield, H&E and phase contrast channels. Gen5™ software is specifically designed to make sample detection, image capture and analysis uncomplicated and efficient.



## Cytation Cell Imaging Multi-Mode Reader

### Automated Microscopy & Multi-Mode Detection

Cytation offers a powerful package of imaging modes, methods and processing capabilities to rival high end dedicated microscopes and imaging systems, bringing affordable imaging to a wide variety of laboratories. Among the features designed for easy use are its unique automation capabilities.



### Fully Automated Imaging System

**Auto X Y Stage** simplifies precise sample positioning and stage movement

**Auto LED** controls up to 100% intensity output

**Auto Exposure** applies an average exposure setting across the plate

**Auto Focus** determines the plane of focus automatically based on plate or sample vessel dimensions

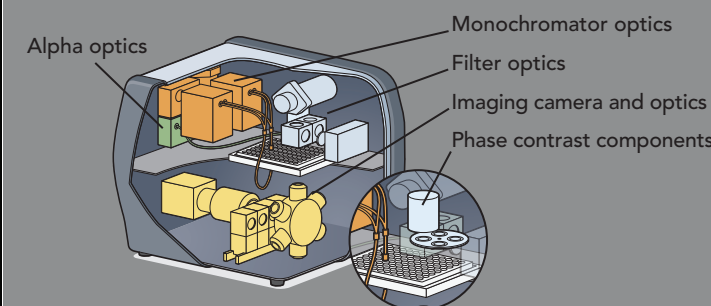
**User-Trained** auto focus improves reproducibility and allows customization per user and sample

### Multi-Mode Detection

The multi-mode detection system available in Cytation can measure fluorescence intensity, time resolved fluorescence, fluorescence polarization, AlphaScreen®/AlphaLISA®, luminescence and UV-Vis absorbance. The patented Hybrid Technology™ brings filter-based and monochromator-based optics together to provide the powerful detection capabilities required for cell-based and other biochemical assays.

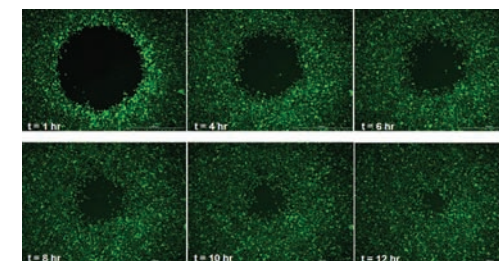
### Modular & Upgradable

Cytation has a modular architecture, so it's easy to select any combination of the independent systems now, and upgrade as the laboratory's needs change.



### Grow It.

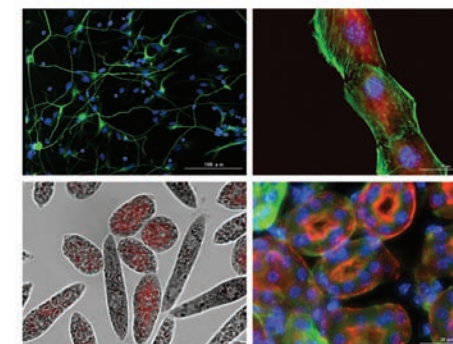
Cytation can be outfitted with a CO<sub>2</sub> / O<sub>2</sub> gas control module along with programmable temperature control to 65 °C and orbital and linear shaking to provide the



optimal environment for live cell-growth assays. An available dual reagent injector module provides precise reagent dispensing in all read operations and detection modes.

### See It.

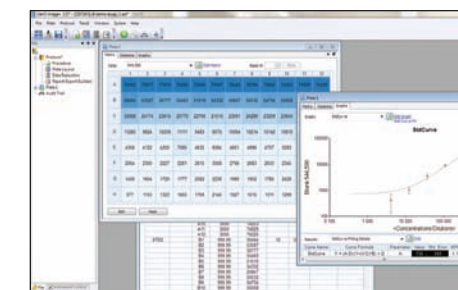
There's never been an easier or faster way to image your cells than in Cytation! The versatile imaging



system provides up to four fluorescent color channels plus brightfield, H&E and phase contrast imaging, making it the ultimate benchtop automated microscopy workstation. Gen5 software offers Auto Easy functions for all steps of imaging, from managing focus to LED intensity for users at all levels (manual operation is also available). Excellent image quality is assured with the 16 bit grayscale CCD camera with Sony chip, along with other high quality optical components.

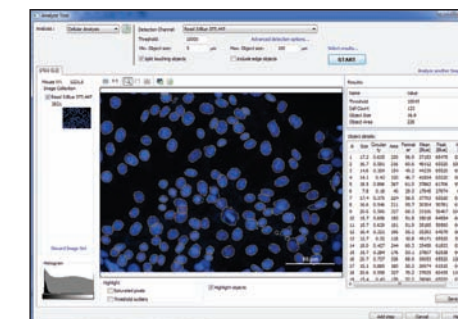
### Read It.

Plate measurement options are nearly limitless in Cytation. The multi-mode microplate detection system offers fluorescence intensity, time-resolved fluorescence, fluorescence polarization, AlphaScreen/AlphaLISA, UV-Vis absorbance, flash and glow luminescence. All modes are available for measuring samples in 6- to 384-well plates, Petri and tissue culture dishes to suit a wide range of applications. If cell imaging is the next step in your workflow, Gen5™ offers a hit-picking function to select just those wells whose intensity meets the imaging threshold. Hit-picking saves time and greatly reduces data analysis and storage requirements.

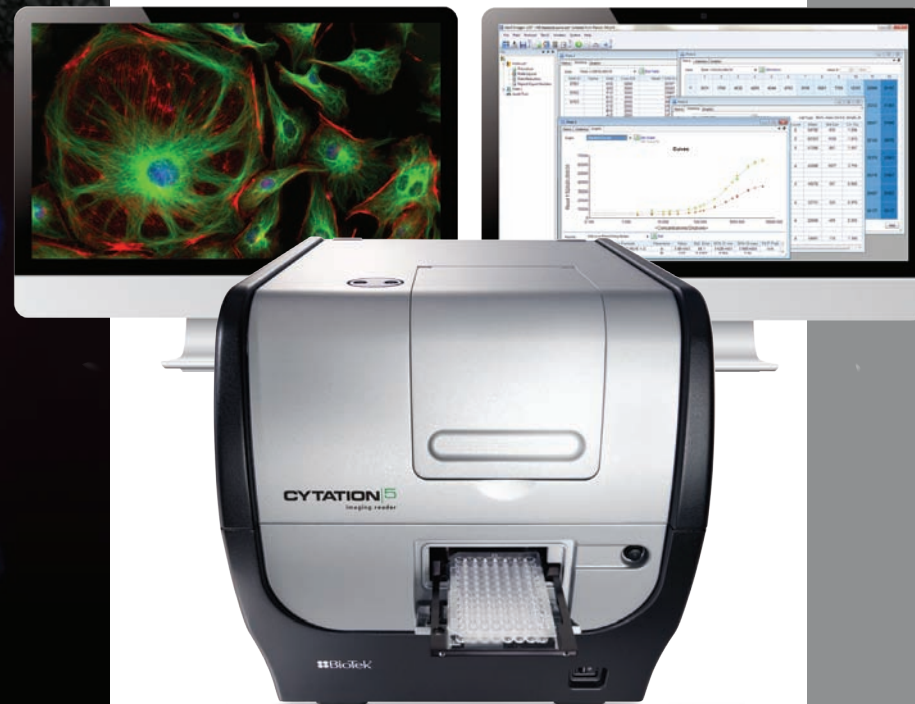


### Count It.

Cytation is controlled by Gen5 software for quantitative and image data collection, processing and analysis. Cell counting is fast and easy, and Gen5 offers comprehensive cellular analyses along with cell counts... automatically. Analysis and results options are intuitive, powerful, and customizable.



# Consistently Brilliant Microscopy & Remarkable Data



Do what you never  
thought possible.

## Typical Applications:

- ▶ 2D and 3D cell imaging and analysis
- ▶ Cell proliferation studies
- ▶ Cytotoxicity
- ▶ Biomarker quantification
- ▶ Drug discovery
- ▶ Genetic analysis
- ▶ Drug absorption and metabolism
- ▶ Biologics drug discovery and development
- ▶ Environmental testing
- ▶ Food safety
- ▶ Nucleic acid quantification
- ▶ Protein quantification

## Think Possible:

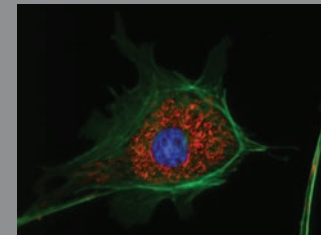
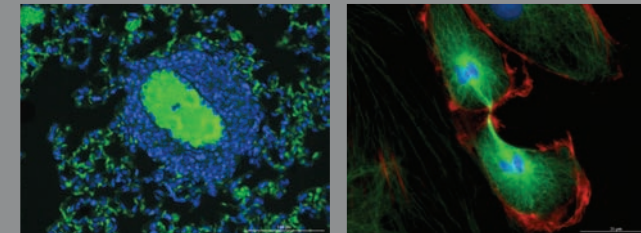
*"Cytation is the ultimate machine for studying protein-protein interactions."*

*"With Cytation I can visualize neurotransmitter release in neurons to better understand how they communicate with each other."*

*"Cytation will allow high-throughput, high-content analysis of our unique model of 3D cultured patient derived cells."*

*"The Cytation will, for the first time, enable a high throughput assessment of the impact of a panel of drugs on cell proliferation and cell viability."*

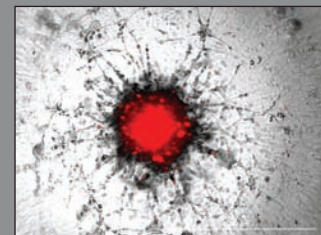
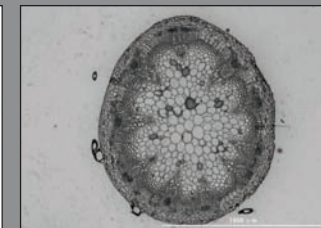
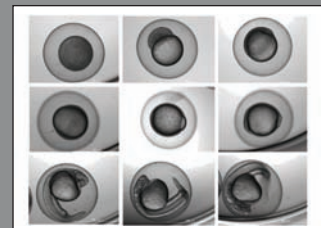
## Imaging Modes Fluorescence



Acquire amazingly detailed images from 2.5x to 60x, allowing visualization of whole organisms to sub-cellular details. Up to 4 channels are available, and with more than 13 colors available, Cytation is

well suited to work with a very wide range of dyes to meet a myriad of cell imaging applications.

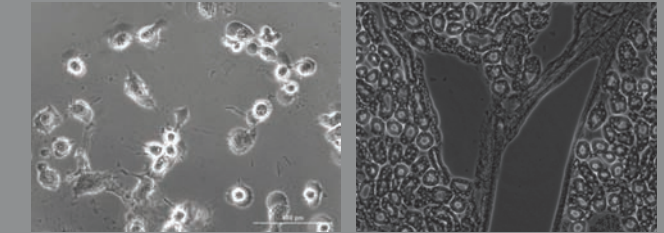
## Brightfield



Cytation offers a brightfield channel to image samples using transmitted light. This mode is very useful for live-cell experiments where label-free conditions are preferred. Specialized auto focus algorithms

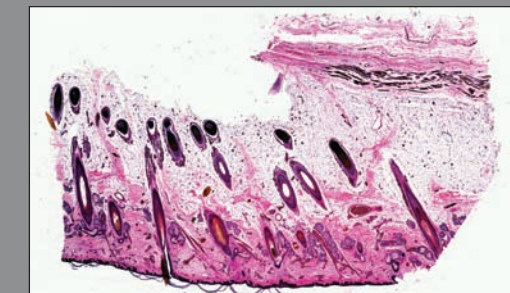
are included to make sure cells remain in focus throughout time-lapse experiments. Brightfield microscopy is often combined with fluorescence imaging to help define sample boundaries (e.g. 3D samples, cellular compartments).

## Phase Contrast



Phase contrast imaging is an important tool to discern structures that are difficult to see with brightfield microscopy. Typically, "difficult" cells have poor contrast among the cell structures, similar transparencies, or very little natural pigmentation. Phase contrast allows cells to be imaged in their natural states without fixing and staining. This mode also provides improved image analysis (compared to brightfield) because of the better foreground/background intensity separation. Phase contrast is especially useful for HCS applications and is available in 4x, 10x, 20x and 40x magnification with Cytation 5.

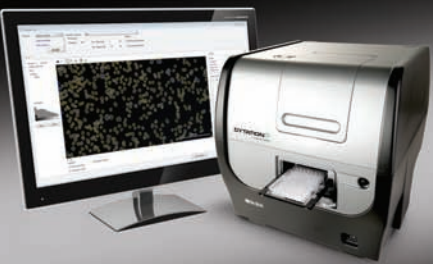
## Color Brightfield



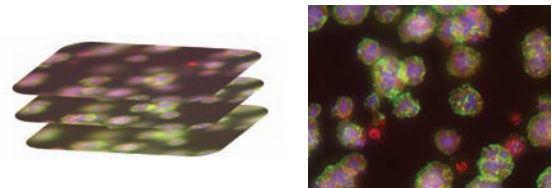
Cytation uses a high quality monochrome camera and sequential red, green and blue LED illumination to capture color images, which are then precisely combined to provide RGB sampled color without interpolation. This unique method requires only one camera, keeping both hardware and software simple...and takes advantage of monochrome sensitivity to provide exceptional image quality. Cytation's color brightfield imaging mode is particularly suited to H&E stain imaging.

Image Methods, Processing & Analysis

Acquiring amazingly detailed images is easy with Cytation™ and Gen5™ Data Analysis Software. Processing and analyzing the images is also easy... and powerful. Z-stacking and z-projection tools are essential for 3D applications and image stitching brings a montage together for a meaningful view. Digital phase, cell counting and subpopulation analysis are all just a few clicks away.

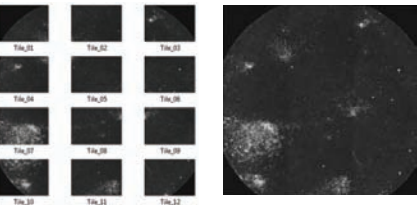


Z-stacking & Z-projection



Z-stacking is an essential capability for 3D imaging applications, such as spheroid, tumoroid and hanging droplet assays whose biology can't be adequately captured with an objective's typical depth of field. Whole organism (zebrafish, C. Elegans) imaging and assays performed in matrigel, such as angiogenesis and tube formation are also important 3D applications where z-stacking provides a multilayered image, aquired over multiple focal planes. With Cytation 5, up to 50 slices can be acquired to capture all important details of the 3D sample. Gen5's z-projection methods offer great flexibility to combine z-stack slices into a single information-rich image.

Image Stitching

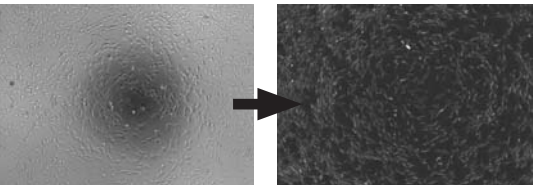


With Cytation and Gen5, it's possible to collect a montage of images – which is commonly necessary when imaging:

- ▶ Many cells for analysis (as in rare event biology)
- ▶ Large objects span out of the field of view of the objective
- ▶ Tissue sections, like H&E slides
- ▶ Live cell kinetics, where cells can move in or out of the field of view

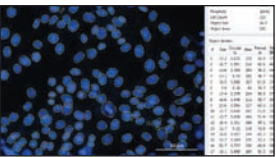
Gen5's image stitching allows multiple image tiles to be software-aligned to create a complete picture of the sample with great accuracy, providing more meaningful data.

Digital Phase Contrast



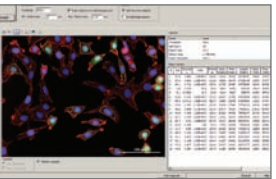
The conventional brightfield and phase contrast imaging modes work very well for samples in larger diameter microplate wells. In 96- and 384-well formats, a meniscus effect can cause uneven illumination of the sample, resulting in a distorted 'bullseye' effect. Digital Phase Contrast is an enhancement technique that digitally corrects the uneven illumination of the brightfield image creating a much more consistent contrast across the image.

Cell Counting & Measurement



With Gen5 software, cell counting is both accurate and intuitive. Advanced pre-processing tools like image smoothing and background flattening help obtain relevant, meaningful images for analysis and details like size, circularity and intensity are automatically calculated.

Subpopulation analysis



When multiple sub-populations are present in a sample, Gen5 can sort by intensity or morphology, enabling analysis of transfection efficiency, nuclear translocation and cell cycle assays.

Specifications

General		
	Cytation 5	Cytation 3
Detection modes	AlphaScreen/AlphaLISA Fluorescence intensity Fluorescence polarization Time-resolved fluorescence Absorbance Luminescence	Fluorescence intensity Fluorescence polarization Time-resolved fluorescence Absorbance Luminescence
Microplate types	6- to 384-well plates	
Other labware	Microscope slides, Petri dishes, cell culture flasks (T25), compatible with Take3 <sup>™</sup> Micro-Volume Plates	
Temperature control	4-Zone incubation to 65°C with Condensation Control; ±0.2 °C at 37 °C	4-Zone incubation to 45 °C with Condensation Control; ±0.2 °C at 37 °C
Shaking	Linear, orbital, double orbital	
Software	Gen5 <sup>™</sup> Data Analysis Software	
Automation	BioStack and 3rd party automation compatible	
CO <sub>2</sub> and O <sub>2</sub> control	Range: 0 - 20% (CO <sub>2</sub> ); 1 - 19% (O <sub>2</sub> ) Control Resolution: ±0.1% (CO <sub>2</sub> and O <sub>2</sub> ) Stability; ±0.2% at 5% CO <sub>2</sub> ; ±0.2% at 1% O <sub>2</sub> Models for both CO <sub>2</sub> and O <sub>2</sub> or CO <sub>2</sub> only are available	
Light source	Xenon flash - fluorescence and absorbance 100 mW laser - AlphaScreen/AlphaLISA (Cytation 5 only)	
Imaging System		
Camera	16-bit gray scale, Sony CCD, 1.1 megapixel	
Imaging mode	Fluorescence Brightfield Phase Contrast H&E Imaging	Fluorescence Brightfield
Imaging method	Single color, Multi-color, Montage, Time Lapse, Z-stacking	
Image processing	Z-Projection, Digital Phase Contrast, Stitching	
Positional controls	Joystick control Software control	Software control
Automated functions	User-trained autofocus, autofocus, autoexposure, auto-LED intensity	
Imaging filter cube capacity	4 onboard, user-replaceable filter cubes	
Imaging filter cubes available	DAPI, CFP, GFP, YFP, RFP, Texas Red, CY5, CY7, Acridine Orange (ACR OR), CFP-YFP FRET, propidium iodide, chlorophyll, phycoerythrin	
Imaging LED cubes available	365 nm, 405 nm, 465 nm, 590 nm, 523 nm, 505 nm, 623 nm, 740 nm	
Objective capacity	6 user-replaceable objectives	2 user-replaceable objectives
Available objectives	2.5x, 4x, 10x, 20x, 40x, 60x	
Phase objectives	4x, 10x, 20x, 40x	n/a
Image collection rate	96 wells, 1 color (DAPI), 4x, 6 minutes 96 wells, 3 colors, 4x, 12 minutes	
Fluorescence Intensity		
Sensitivity	Monochromators: Top: fluorescein 2.5 pM (0.25 fmol/well 384-well plate) Bottom: fluorescein 4 pM (0.4 fmol/well 384-well plate)  Filters/mirrors: Fluorescein 0.25 pM (0.025 fmol/well 384-well plate)	
Wavelength selection	Quadruple monochromators (top/bottom) and deep blocking bandpass filters/dichroic mirrors (top)	
Wavelength range	Monochromators: 250 - 700 nm (850 nm option) Filters: 200 - 700 nm (850 nm option)	

	Cytation 5	Cytation 3
Monochromator bandwidth	Variable from 9 nm to 50 nm in 1 nm increments	Fixed, 16 nm
Detection system	Two PMT detectors: one for monochromator system, one for filter system	
Dynamic range	7 decades	5 decades
Luminescence		
Sensitivity	Monochromator system: 20 amol ATP (flash) Filter system: 10 amol ATP (flash) 100 amol ATP (glow)	
Wavelength range	300 - 700 nm	
Dynamic range	>6 decades	
Fluorescence Polarization		
Sensitivity	1.2 mP standard deviation at 1 nM fluorescein	
Wavelength range	280 - 700 nm (850 nm option)	
Time-Resolved Fluorescence		
Sensitivity	Europium 40 fM with filters (4 amol/well in 384-well plate) Europium 1200 fM with monos (120 amol/well in 384-well plate).	
Wavelength range	Monos: 250 - 700 nm (850 nm option) Filters: 200 - 700 nm (850 nm option)	
Alpha Detection		
Light source	680 nm laser, 100 mW	n/a
Wavelength selection	Filter (top only)	n/a
Sensitivity	100 amol LCK peptide (384-well low volume plate)	n/a
Absorbance		
Wavelength selection	Monochromator	
Wavelength range	230 - 999 nm, 1 nm increment	
Bandwidth	4 nm (230-285 nm), 8 nm (>285 nm)	
Dynamic range	0 - 4.0 OD	
Resolution	0.0001 OD	
Reagent Injectors		
Number	2 syringe pumps	
Supported detection modes	All modes	
Dispense volume	5 - 1000 µL in 1 µL increment	
Dead volume	1 mL, 100 µL with back flush	
Plate geometry	6- to 384-well plates, Petri dishes	
Dispense precision	≤2% at 50-200 µL	
Dispense accuracy	±1 µL or 2%	
Physical Characteristics		
Power	250 Watts max.	130 Watts max.
Dimensions	20" D x 16.5" W x 17.5" H (50.8 cm x 41.91 cm x 44.5 cm)	
Weight	80 lbs (36.3 Kg)	
Regulatory		
Regulatory	CE and TUV marked. RoHS Compliant. Models for In Vitro Diagnostic use are available.	

Specifications are subject to change. Performance values represent the average observed factory test values.