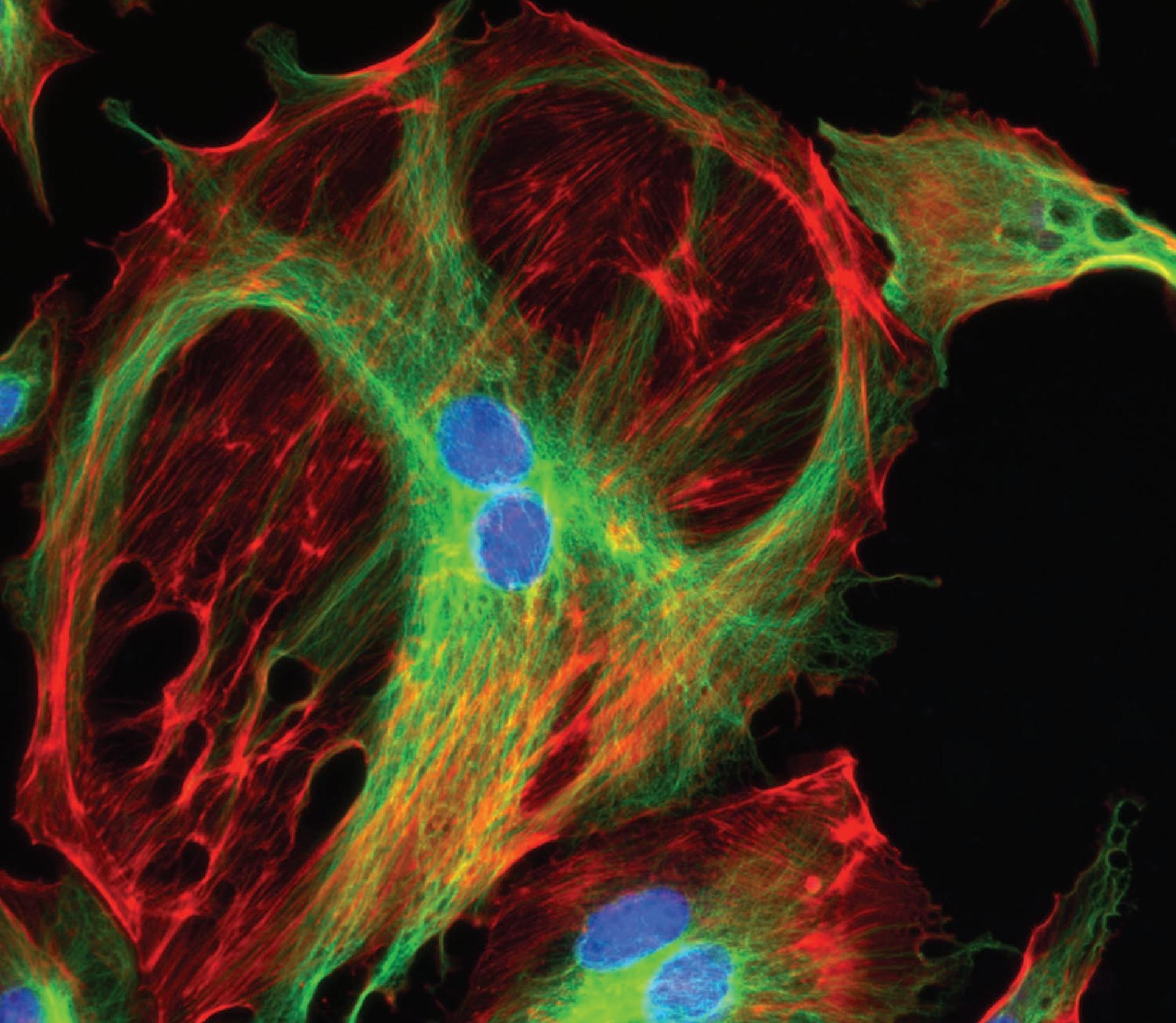


## Cytation™ Imaging Readers

See Possible.



Think Possible



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, color brightfield and phase contrast channels. Gen5™ software is specifically designed to make sample detection, image capture and analysis uncomplicated and efficient.

**CYTATION|5**  
imaging reader

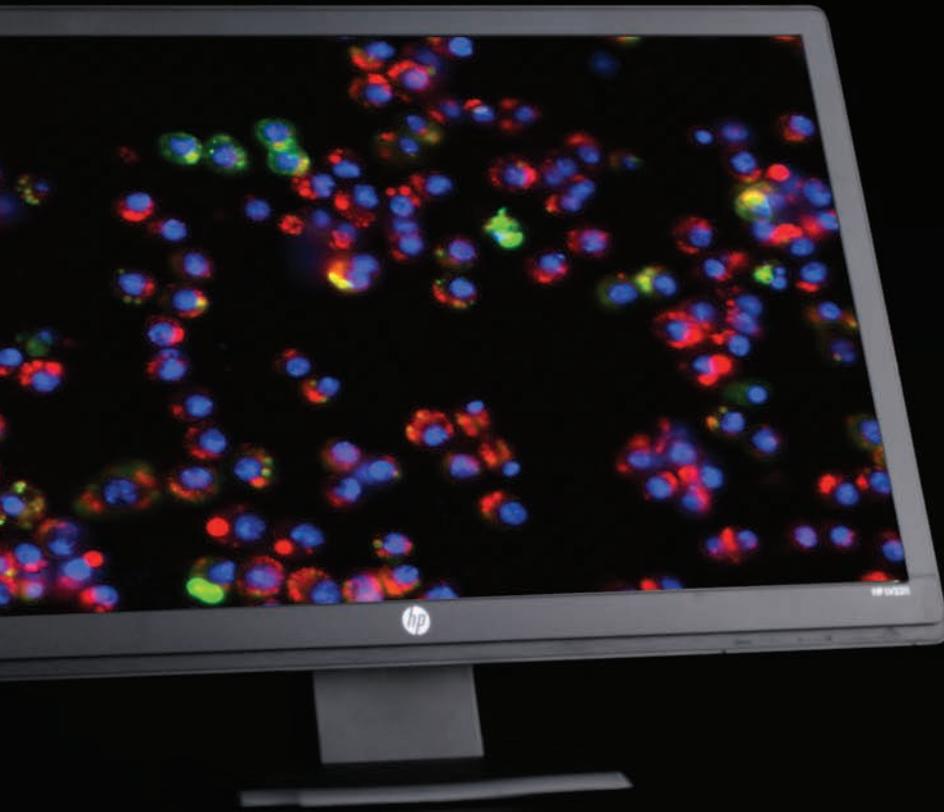
 BioTek



# 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**, both image-based and laser autofocus provide fast and reliable acquisition for many applications

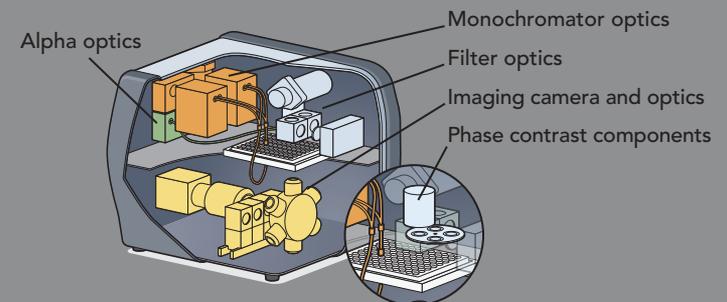
**User-Trained** auto focus improves reproducibility and allows customization per user and sample

### Multi-Mode Detection

The multi-mode detection system available in Cytation can measure fluorescence intensity, time resolved fluorescence, fluorescence polarization, Alpha, 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.

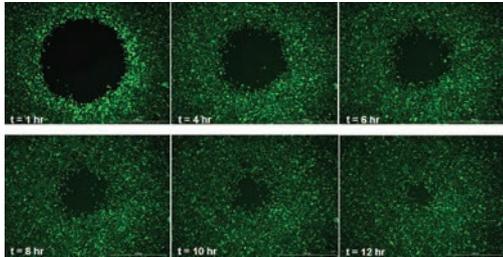
### Modular & Upgradable

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.

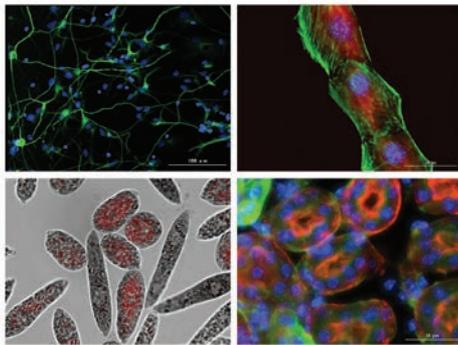
Cytation can be outfitted with a CO<sub>2</sub> / O<sub>2</sub> gas control module along with programmable temperature control to 65 °C and orbital and linear shaking to provide the



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

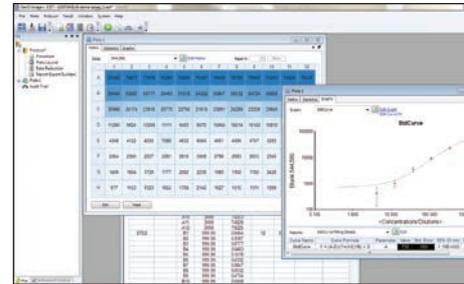


system provides up to four fluorescent color channels plus brightfield, color brightfield and phase contrast imaging, making it the ultimate benchtop automated microscopy workstation. Gen5 software offers Auto Easy functions for all steps

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

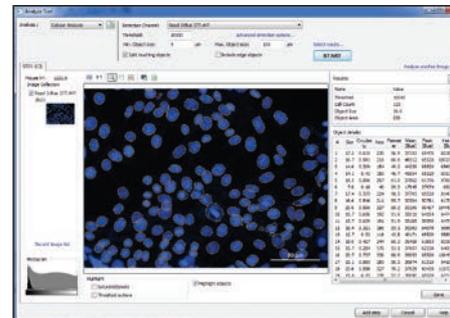


offers fluorescence intensity, time-resolved fluorescence, fluorescence polarization, AlphaScreen/AlphaLISA, UV-Vis absorbance, flash and glow luminescence. All modes are available for measuring samples

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

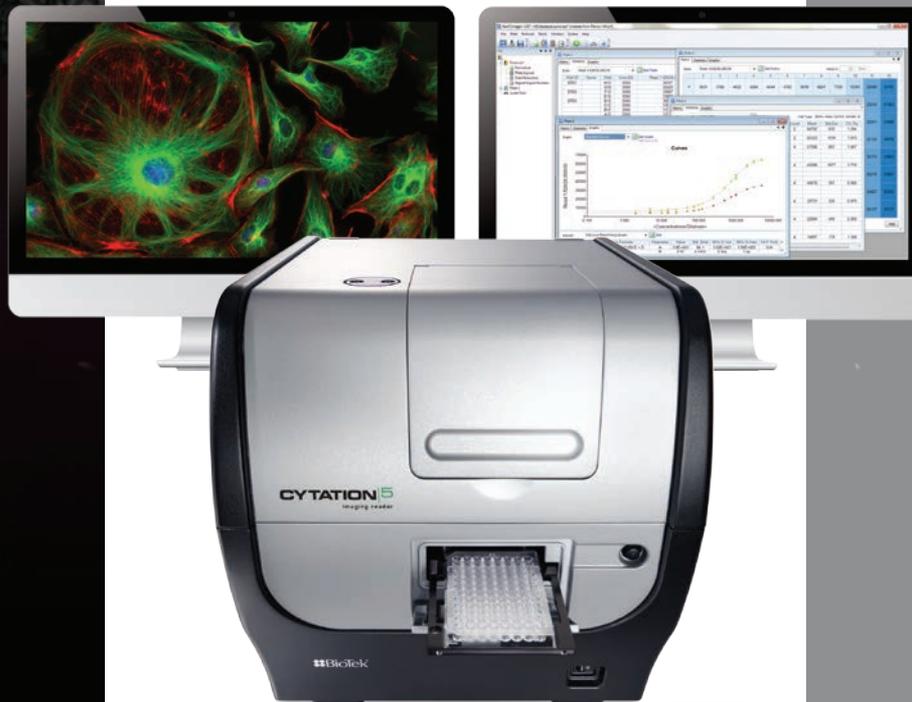
## Think Possible:

*"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."*

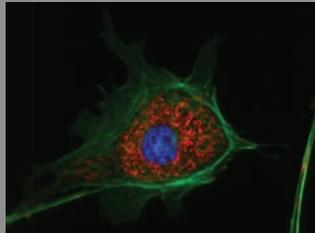
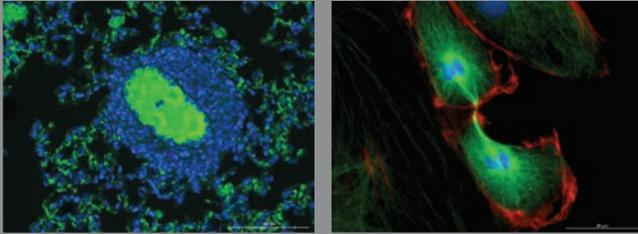
*"Cytation will allow high-throughput, high-content analysis of our unique model of 3D cultured patient derived cells."*

*"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

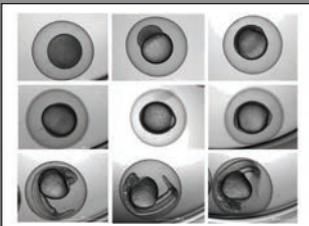
## Fluorescence



Acquire amazingly detailed images from 1.25x to 60x, allowing visualization of whole organisms to sub-cellular details. Up to 4 channels are available, and with more than 15 colors available, Cytation is

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

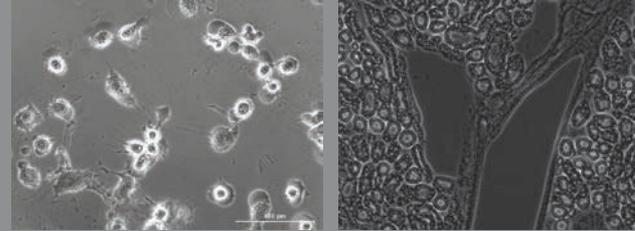
## Brightfield



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

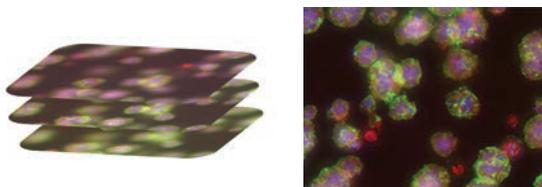


Cytation uses a high quality monochrome camera and sequential red, green and blue LED illumination to capture color images, which are then precisely combined to provide RGB sampled color without interpolation. This unique method requires only one camera, keeping both hardware and software simple...and 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

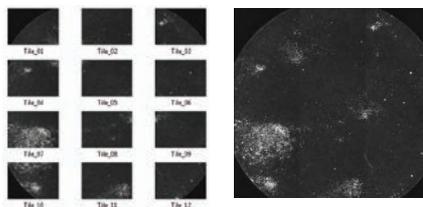
Acquiring amazingly detailed images is easy with Cytation™ and Gen5™ Data Analysis Software. Processing and analyzing the images is also easy... and powerful. Z-stacking and z-projection tools are essential for 3D applications and image stitching brings a montage together for a meaningful view. Digital 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, acquired 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

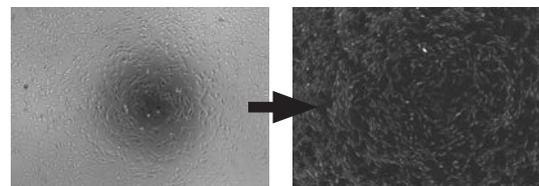


With Cytation and Gen5, it's possible to collect a montage of images – which is commonly necessary when imaging:

- ▶ 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

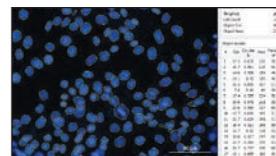
Gen5's image stitching allows multiple image tiles to be software-aligned to create a complete picture of the sample with great accuracy, providing more meaningful data.

## 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.

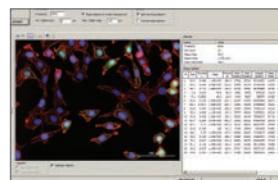
## Cell Segmentation & Measurement



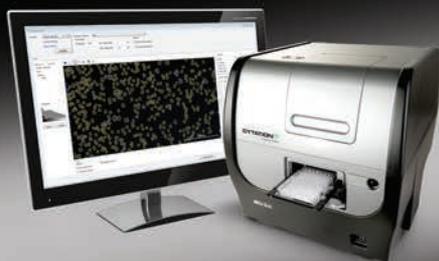
With Gen5 software, cell segmentation is both accurate and intuitive. Advanced pre-processing tools like image smoothing

and background flattening help obtain relevant, meaningful images for analysis and details like morphology and intensity are automatically calculated for the different cellular compartments.

## Subpopulation analysis



When multiple subpopulations 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
<b>Detection modes</b>	AlphaScreen/AlphaLISA Fluorescence intensity Fluorescence polarization Time-resolved fluorescence Absorbance Luminescence	Fluorescence intensity Fluorescence polarization Time-resolved fluorescence Absorbance Luminescence
<b>Microplate types</b>	Monochromators: 6- to 384-well plates Filters & imaging: 6- to 1536-well plates	
<b>Other labware</b>	Microscope slides, Petri dishes, cell culture flasks (T25), hemocytometers, compatible with Take3™ Micro-Volume Plates	
<b>Temperature control</b>	4-Zone incubation to 65 °C with Condensation Control	4-Zone incubation to 45 °C with Condensation Control
<b>Shaking</b>	Linear, orbital, double orbital	
<b>Software</b>	Gen5™ Data Analysis Software	
<b>Automation</b>	BioStack and 3rd party automation compatible	
<b>CO<sub>2</sub> and O<sub>2</sub> control</b>	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> )	
<b>Light source</b>	Xenon flash - fluorescence and absorbance 100 mW laser - AlphaScreen/AlphaLISA (Cytation 5 only)	
Imaging System		
<b>Camera</b>	16-bit gray scale, Sony CCD, 1.1 megapixel	
<b>Imaging mode</b>	Fluorescence Brightfield Phase Contrast Color brightfield	Fluorescence Brightfield
<b>Imaging method</b>	Single color, Multi-color, Montage, Time Lapse, Z-stacking	
<b>Image processing</b>	Z-Projection, Digital Phase Contrast, Stitching	
<b>Positional controls</b>	Joystick control Software control	Software control
<b>Automated functions</b>	User-trained autofocus, image-based and laser autofocus, autoexposure, auto-LED intensity	
<b>Imaging filter cube capacity</b>	4 onboard, user-replaceable filter cubes	
<b>Imaging filter cubes available</b>	DAPI, CFP, GFP, YFP, RFP, Texas Red, CY5, CY7, Acridine Orange (ACR OR), CFP-YFP FRET, propidium iodide, chlorophyll, phycoerythrin CY5.5, TagBFP, GFP(Ex)-CY5(Em), RFP(Ex)-CY5(Em)	
<b>Imaging LED cubes available</b>	365 nm, 405 nm, 465 nm, 590 nm, 523 nm, 505 nm, 623 nm, 740 nm	
<b>Objective capacity</b>	6 user-replaceable objectives	2 user-replaceable objectives
<b>Available objectives</b>	1.25x, 2.5x, 4x, 10x, 20x, 40x, 60x	
<b>Phase objectives</b>	4x, 10x, 20x, 40x	n/a
<b>Image collection rate</b>	96 wells, 1 color (DAPI), 4x, 6 minutes 96 wells, 3 colors, 4x, 12 minutes	
<b>Image analysis software option</b>	Gen5 Image+, Gen5 Image Prime	
Fluorescence Intensity		
<b>Sensitivity</b>	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)	
<b>Wavelength selection</b>	Quad monochromators (top/bottom) and Filters (top)	
<b>Wavelength range</b>	Monochromators: 250 - 700 nm (850 nm option) Filters: 200 - 700 nm (850 nm option)	

	Cytation 5	Cytation 3
<b>Monochromator bandwidth</b>	Variable from 9 nm to 50 nm in 1 nm increments	Fixed, 16 nm
<b>Detection system</b>	Two PMT detectors: one for monochromator system, one for filter system	
<b>Dynamic range</b>	7 decades	5 decades
Luminescence		
<b>Sensitivity</b>	Monochromator system: 20 amol ATP (flash) Filter system: 10 amol ATP (flash) 100 amol ATP (glow)	
<b>Wavelength range</b>	300 - 700 nm	
<b>Dynamic range</b>	>6 decades	
Fluorescence Polarization		
<b>Sensitivity</b>	1.2 mP standard deviation at 1 nM fluorescein	
<b>Wavelength range</b>	280 - 700 nm (850 nm option)	
Time-Resolved Fluorescence		
<b>Sensitivity</b>	Europium 40 fM with filters (4 amol/well in 384-well plate) Europium 1200 fM with monos (120 amol/well in 384-well plate).	
<b>Wavelength range</b>	Monos: 250 - 700 nm (850 nm option) Filters: 200 - 700 nm (850 nm option)	
Alpha Detection		
<b>Light source</b>	680 nm laser, 100 mW	n/a
<b>Wavelength selection</b>	Filter (top only)	n/a
<b>Sensitivity</b>	100 amol LCK peptide (384-well low volume plate)	n/a
Absorbance		
<b>Wavelength selection</b>	Monochromator	
<b>Wavelength range</b>	230 - 999 nm, 1 nm increment	
<b>Bandwidth</b>	4 nm (230-285 nm), 8 nm (>285 nm)	
<b>Dynamic range</b>	0 - 4.0 OD	
<b>Resolution</b>	0.0001 OD	
Reagent Injectors		
<b>Number</b>	2 syringe pumps	
<b>Supported detection modes</b>	All modes	
<b>Dispense volume</b>	5 - 1000 µL in 1 µL increment	
<b>Dead volume</b>	<1.1 mL with back flush	
<b>Plate geometry</b>	6- to 384-well plates, Petri dishes	
<b>Dispense precision</b>	≤2% at 50-200 µL	
<b>Dispense accuracy</b>	±1 µL or 2%	
Physical Characteristics		
<b>Power</b>	250 Watts max.	130 Watts max.
<b>Dimensions</b>	20" D x 16.5" W x 17.5" H (50.8 cm x 41.91 cm x 44.5 cm)	
<b>Weight</b>	80 lbs (36.3 Kg)	
Regulatory		
<b>Regulatory</b>	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.

Think Possible



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.

**BioTek Instruments, Inc.**

Tel: 802-655-4040 • Toll-Free: 888-451-5171 • Outside the USA: 802-655-4740

## High Quality Imaging. High Quality Components.

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*



*Cytation 5 and BioSpa™ 8  
Automated Incubator*



*Olympus and  
Zeiss Objectives*



*LED Cubes and Filter Cubes  
with Semrock Filters*



*Cytation 5 and BioStack  
Microplate Stacker*



*Gas Controller Module*

