

Pre-clinical *in vivo* imaging



Key Benefits

- Market trusted technology offering a full suite of leading imaging technologies, reagents and support
- Exquisite sensitivity in bioluminescence
- Full fluorescence tunability through the NIR spectrum
- Compute Pure Spectrum spectral unmixing for ultimate fluorescence sensitivity
- Expandable system tailored to your workflow

2D Bioluminescence and Fluorescence *In Vivo* Imaging

The IVIS® Lumina Series III from PerkinElmer provides an expandable, sensitive imaging system in a benchtop format that is easy to use for *in vivo* 2D fluorescence and bioluminescence imaging. The IVIS Lumina Series III platform offers a full spectrum of wavelengths to perform almost any *in vivo* optical application with a tunability of 20 nm. The system includes a highly sensitive CCD camera, light-tight imaging chamber and complete automation and analysis capabilities. As the leading optical imaging platform for *in vivo* analysis, IVIS systems include a range of practical accessories developed through experience in research laboratories worldwide.

Leading Bioluminescence and Multispectral Fluorescence Technologies

The IVIS Lumina Series III platform brings together years of leading optical imaging technologies into one easy to use and exquisitely sensitive bench-top system and is capable of imaging both full spectrum fluorescence and bioluminescence. The system is equipped with 26 filters that can be used to image reporters that emit from green to near-infrared. Superior spectral unmixing can be achieved by IVIS Lumina III's high resolution short cut off filters. Absolute calibration coupled with our Living Image® software affords you consistent and reproducible results independent of magnification and/or filter selection. This allows you to compare results from one IVIS system to another, either within your organization or around the world. All IVIS Lumina III series instruments now incorporate PerkinElmer's patented Compute Pure Spectrum (CPS) algorithm for spectral library generation software tools to ensure accurate autofluorescence removal, unmixing and fluorophore quantitation.

Exquisite Sensitivity

The Series III provides the highest degree of sensitivity of any optical imaging system on the market representing the gold standard for non-invasive small animal optical imaging sensitivity. This degree of sensitivity is achieved through the combination of optimized luciferase reporters, agents and unique platform technologies including an Ultra Cooled CCD USB Camera to -90 °C, low readout noise, dark current and exceptionally high quantum efficiency throughout the NIR spectrum.

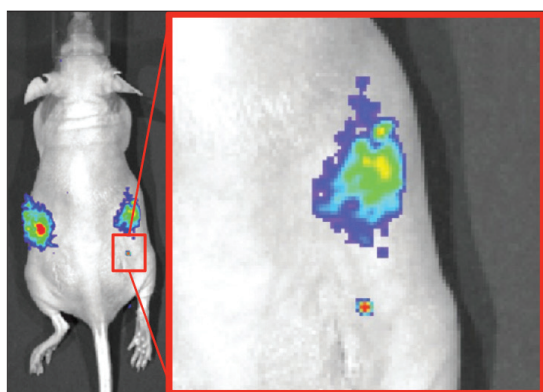


Figure 1. Single cell imaging of a 4T1-luc2 cell in vivo. Bioware Ultra cell lines used in conjunction with IVIS Imaging Systems allows researchers to measure and monitor tumor growth and metastasis, non-invasively, using a small number of cells before tumors are palpable.

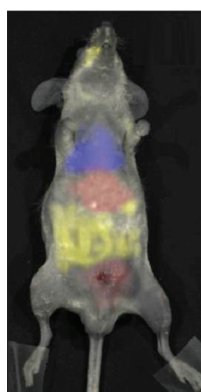


Figure 2. Spectral un-mixing of four separate spectral paths to identify the lungs (800 nm), liver (680 nm), gut (660 nm) and auto-fluorescence.

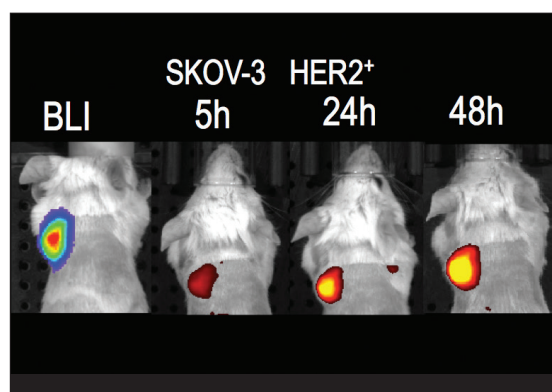


Figure 3. Imaging studies were performed using SKOV-3 tumor-bearing female Scid/Beige mice injected i.v. with 40 mg of Her2Sense 645 and imaged at 5, 24, and 48 hours post injection.

An adjustable field of view from 5 – 12.5 cm and an optional 24 cm lens allows imaging of up to 5 mice or 2 medium size rats or zoom lens capability increasing the resolution to 35 μ m at a field of view of 2.5 cm. The IVIS Lumina Series III can also accommodate petri dishes or micro-titer plates for *in vitro* imaging. The system includes premium animal handling features such as a heated stage, gas anesthesia connections and ECG monitoring.

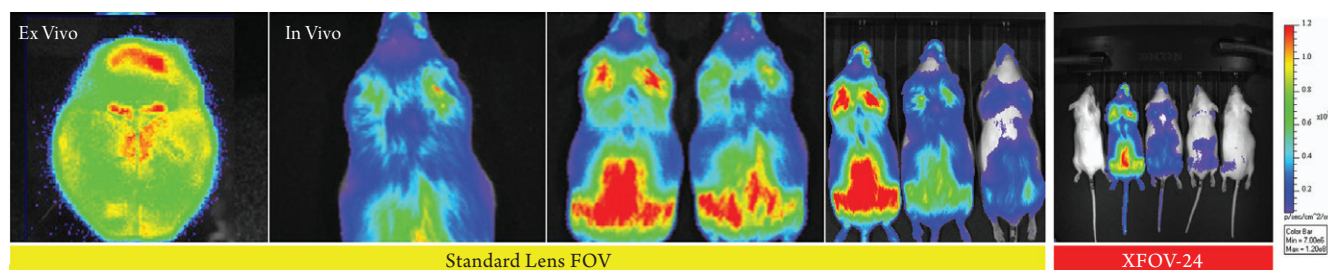


Figure 4. The IVIS Lumina Series III Imaging System provides 5 fields of view.

Living Image Software

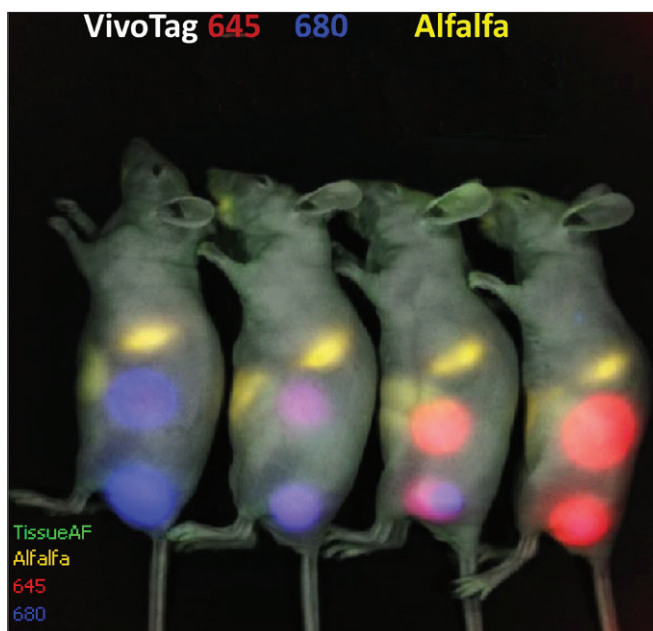
Living Image software is an advanced tool designed specifically for the IVIS Imaging system platform and contains features to help design image acquisition and analysis. The software's new design creates an intuitive, seamless workflow for researchers of all skill levels. New features include: wizard based guidance for advanced imaging protocols, advanced spectral unmixing tools and new color templates.

Multispectral Imaging with Advanced Spectral Unmixing Algorithms

With 2D fluorescence imaging, the presence of multiple spectrally overlapping fluorophores in the subject can present challenges for interpreting imaging results. With the Living Image spectral unmixing (SPUM) tool you can easily identify, separate, isolate, visualize and quantify multiplexed fluorescent signals.

Living Image software is designed to simplify advanced and complex biological models by intuitively guiding the user through experiential setup and analysis. The imaging wizard with probe library helps design imaging settings and select the right filter pair for fluorescence studies.

Advanced spectral-unmixing algorithms and a broad range of high spectral resolution filter sets minimize autofluorescence and provides the opportunity to image a wide variety of targeted and activatable fluorescent probes and reporters.



Nu/nu mice received local injections of different ratios of VivoTag645 and VivoTag 680 in two sites per mouse to provide full titrations from 0-100 pmols of fluorescence per spot. Tissue autofluorescence (green), chow autofluorescence (yellow), VivoTag 645 (red), and VivoTag 680 (blue) were separated by guided spectral unmixing (SPUM). This dataset yielded pure spectra for each component allowing the independent quantification of each of the individual fluorescence signals respectively and a composite image of all four components was generated.

IVIS Lumina Series III Optional Accessories

						
Animal Isolation Chamber Kit XIC-3 Cat No. 123997	IVIS Syringe Injection System Cat No. 124633	ECG Monitoring System Cat No. 124229	ZFOV-24 Zoom Lens Cat No. 126827	RAS-4 Anesthesia System Cat No. 146737	XPM-2 Phantom Mouse for Bioluminescent Imaging Cat No. 133793	IWB-60 Workbench Cat No. 149578
					XFM-2 Phantom Mouse for Fluorescent Imaging Cat No. 133803	

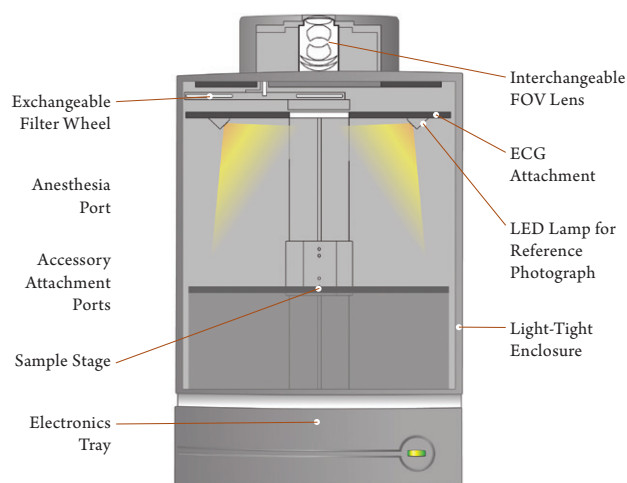
Inside the IVIS Lumina Series III

CCD Camera

- The IVIS Lumina Series III CCD camera is 13 x 13 mm square, with 1024 x 1024 pixels 13 micron in width, yields higher imaging resolution
- Back-thinned, back-illuminated grade 1 CCD provides high quantum efficiency over the entire visible to near-infrared spectrum
- 16-bit digitizer delivers broad dynamic range
- The CCD is thermoelectrically (Peltier) cooled to -90 °C ensuring low dark current and low noise

Imaging Chamber

- Light-tight imaging chamber
- High light collection lens, f/0.95 – f/16
- Optional 24 cm FOV lens attachment
- 8-position emission filter wheels – 7 filters
- 20-position excitation filter wheels – 19 filters
- LED lamps for photographic images
- Heated stage to maintain optimum body temperature



- Motor controlled stage, filter wheel, lens position, and f-stop
- Optional integrated ECG monitoring system

Integrated Gas Anesthesia

- Gas anesthesia ports and 3 position manifold within imaging chamber allow anesthesia to be maintained during imaging sessions

The IVIS Lumina Series III platform offers a selection of instruments tailored to your *in vivo* imaging needs

Features	IVIS Lumina	IVIS Lumina XRMS	IVIS Lumina LT
Bioluminescence	✓	✓	✓
Radioisotopic Cerenkov Imaging	✓	✓	✓
Fluorescence	✓	✓	✓
Compute Pure Spectrum Spectral Unmixing	✓	✓	
Integrated X-Ray		✓	
Extended NIR Range 150W Tungsten EKE	✓	✓	✓
Absolute Calibration to NIST® Standards	✓	✓	✓

IVIS Lumina XR Series III Imaging System

Imaging System Components:	Specifications
Camera Sensor	Back-thinned, back-illuminated, cooled Grade 1 CCD
CCD Size	1.3 x 1.3 cm
Imaging Pixels	1024 x 1024
Quantum Efficiency	>85% at 500 – 700 nm, >30% at 400 – 900 nm
Pixel Size	13 microns
Minimum Field of View (FOV)	5 x 5 cm
Maximum Field of View (FOV)	12.5 x 12.5 cm (optional 24 x 24 cm)
Minimum Image Pixel Resolution	50 microns
Read Noise	< 3 electrons for bin = 1, 2, 4; < 5 electrons for bin = 8, 16
Dark Current (Typical)	< 120 electrons/s/cm ² ; or 2 x 10 ⁻⁴ electrons/s/pixel
Lens	f/1.95 – f/16, 50 mm
Illumination Source	Extended NIR Range 150W Tungsten EKE
Fluorescence Capability	Standard
Excitation Fluorescence Filters	19
Emission Fluorescence Filters	7
CCD Operating Temperature	-90 °C
Imaging System Space Requirement	48 x 71 x 104 cm (W x D x H)
Imaging Chamber Interior Dimension	43 x 38 x 43 cm (W x D x H)
Power Requirements	6A at 120V
Stage Temperature	20 – 40 °C
Computer (Minimum Specifications)	Dell Precision 5820, Intel Xeon Quad Core 3.6 GHz; 32 GB RAM; Nvidia Quadro P620 2 GB; 500 GB system HD, 2TB data HD; 8x DVD+/-RW Drive; 24" widescreen LED Monitor; 24" Dell Monitor, Win 10 Enterprise
Living Image Software	1 acquisition copy and 4 analysis copies of Living Image software

For more information, please visit our website at www.perkinelmer.com/invivo

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