IVIS SpectrumBL

PRODUCT NOTE

Pre-clinical *in vivo* imaging

Key Features

- Ultra high-sensitivity to support *in vivo* bioluminescence, chemiluminescence and Cerenkov imaging
- High-throughput (10 mice) imaging enablement
- High resolution (to 20 microns) with 3.9 cm field of view
- 3D diffuse tomographic reconstruction for bioluminescence
- Co-register 3D optical data with microCT, PET/SPECT and MRI
- NIST traceable absolute calibration
- Optional upgrade path to an IVIS Spectrum for full fluorescence enablement

High-Throughput *In Vivo* Bioluminescence Imaging System

The IVIS® SpectrumBL is an advanced high-throughput 2D and 3D optical imaging system designed to improve quantitative outcomes of bioluminescence, chemiluminescence and Cerenkov *in vivo* imaging.

The SpectrumBL supports 10 mice simultaneous imaging for true high-throughput imaging for longitudinal studies to support large cohorts of mice. It uses unique optical imaging technology to facilitate non-invasive longitudinal monitoring of disease progression, cell trafficking and gene expression patterns in living animals.

PerkinElmer®
For the Better

High-Throughput Bioluminescence Imaging

The IVIS SpectrumBL provides the best in class bioluminescence sensitivity, a standard with all IVIS imaging systems, with the ability to image 10 mice (Figure 1) at once. The 10 mouse manifold that comes standard with SpectrumBL improves drug discovery workflow by reducing imaging times for longitudinal studies in half. The chart (Figure 1) shows that with SpectrumBL 120% more compounds can be evaluated annually *in vivo*. Getting more compounds screened for target or biomarker validation *in vivo* during the earlier stages of pre-clinical drug discovery significantly improves efficiency in later clinical stage development.

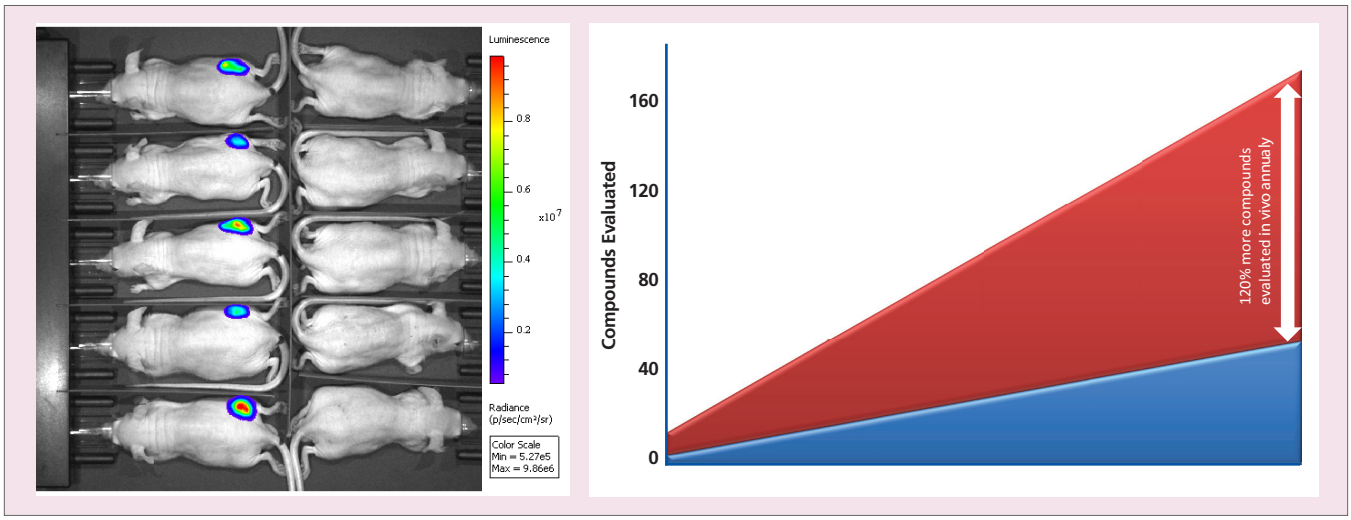


Figure 1. A representative image of ten mice being imaged *in vivo*. Chart on the right illustrates how significantly more drug candidates can be evaluated *in vivo* due to the high-throughput imaging capabilities of SpectrumBL.

Bioluminescence Imaging - Best in Class *In Vivo* Sensitivity

IVIS SpectrumBL has a cooled (-90 °C) camera with large CCD chip area and low F-stop for high sensitivity bioluminescent light detection. Image multiple bioluminescent reporters such as firefly luciferase, Renilla luciferase and bacterial luciferase *in vivo* at depth with rapidly and quantitatively. The ultra sensitive camera optics allows single cell detection, earlier monitoring of micrometastasis *in vivo* and track tumor development longitudinally *in vivo.* Other applications include infectious disease (Figure 3), stem cell tracking and toxicology.

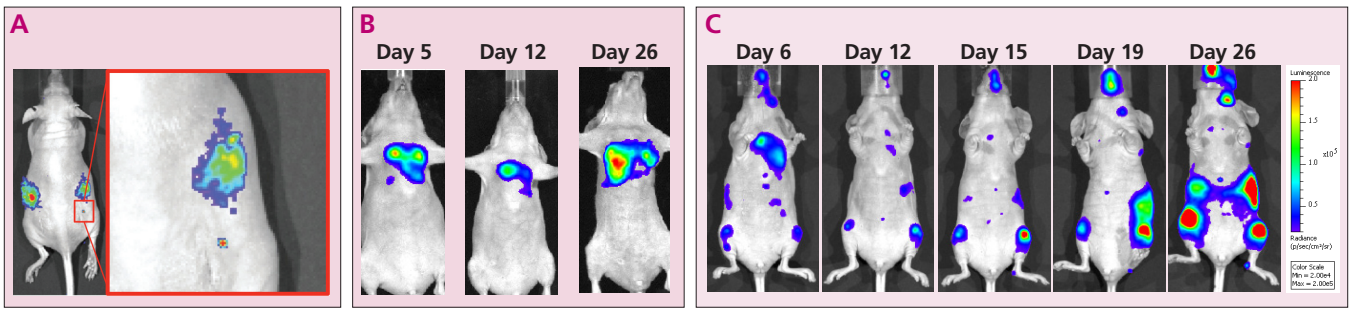


Figure 2. Single cell detection of 4T1-luc2 cells injected subcutaneously in nude mice (A), monitoring NCI-H460-luc2 lung tumor growth by NCI-H460-luc2 (B) and metastasis post intracardiac injection of MDA-MA-231-luc2 cells longitudinally (C).

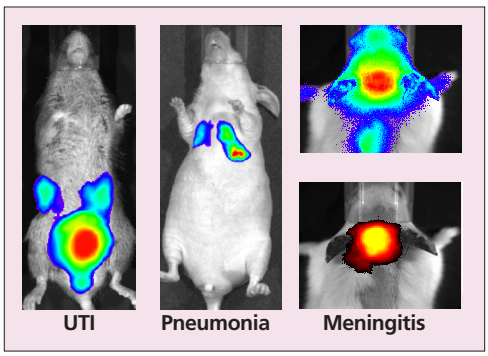


Figure 3. Tracking infection progression in models of UTI, pneumonia and meningitis.

Cerenkov Imaging – Optimized Software Tools for Faster Workflow

Living Image® software brings IVIS technology to life by facilitating an intuitive workflow for image acquisition, analysis and data organization Living Image software in SpectrumBL has new features such as an imaging mode optimized for Cerenkov imaging. The software guides the user for optimal camera parameter settings for high signal-to-noise when detecting light emitted from radionuclide-injected animal subjects.

The optional DyCE™ mode makes it very easy to set up biodistribution scans of radiopharmaceuticals. Spectrally unmix radionuclides from other light-emitting probes of very different spectra. The DyCE technique acquires a series of dynamic images following an injection of radionuclide. The location of major internal organs is derived by proprietary algorithms and displayed in minutes (Figure 4). The DyCE software module includes the Multi-View platform and software that extends the functionality of Living Image and is available for all IVIS systems.

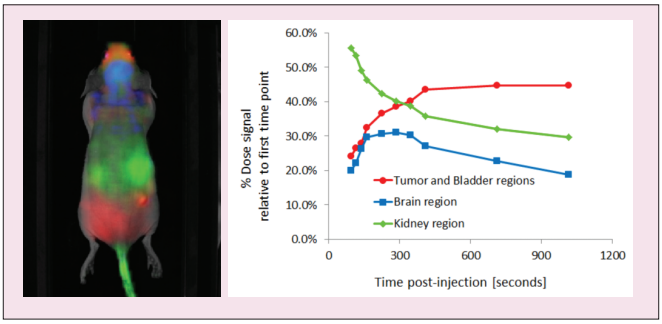


Figure 4. A mouse bearing a subcutaneous 4T1-luc2 tumor in its right flank was injected with 315 µCi of ^{18}F-FDG intravenously. The animal was imaged dynamically starting 55 seconds post-injection to capture the distribution of ^{18}F-FDG in the mouse body via Cerenkov light from positron emission.

Advanced 3D Analysis with MicroCT Co-registration Tools

Look deeper, see further, and take science to a new level of sophistication with the 3D technology from PerkinElmer. 3D diffuse luminescence tomography (DLIT) utilizes structured light data with bioluminescence images to reconstruct three dimensional representations of bioluminescent reporters. Take the next step and analyze 3D sources in an anatomical context with the Digital Mouse Atlas (Figure 5).

The tomography tool allows the quantification of the number of cells in a tumor and 3D co-registration of bioluminescent reporter. Seamlessly co-register 3D bioluminescence with Quantum FX microCT (Figure 6).

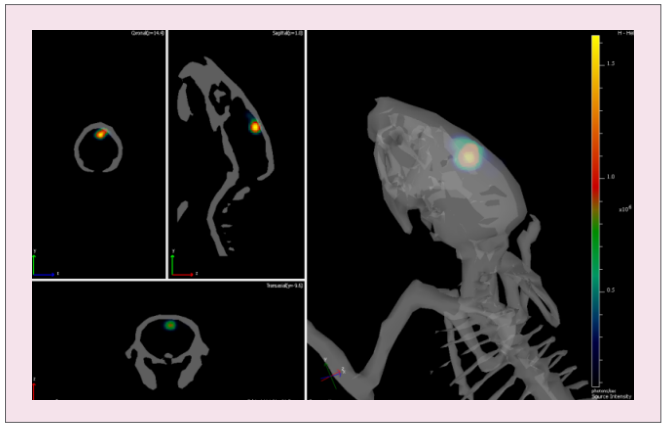


Figure 5. DLIT 3D reconstruction shows precise localization of GL261-luc2 brain tumor using digital mouse atlas.

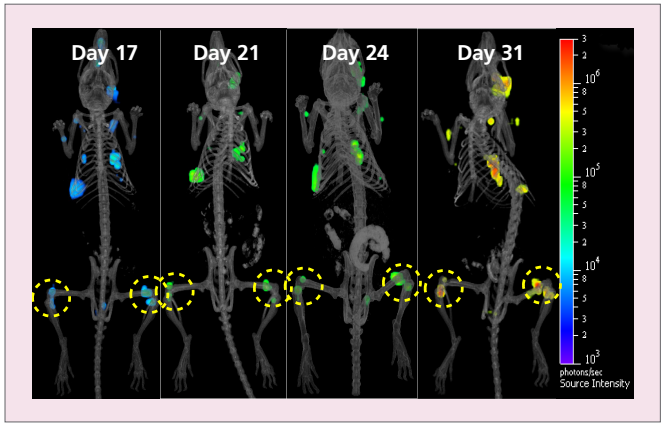


Figure 6. Optical-CT co-registration of osteolytic tumors with Quantum FX microCT. Mice were implanted with MDA-MB-231-luc-D3H2Ln cells by intracardiac injection.

Inside the IVIS SpectrumBL

Imaging Chamber

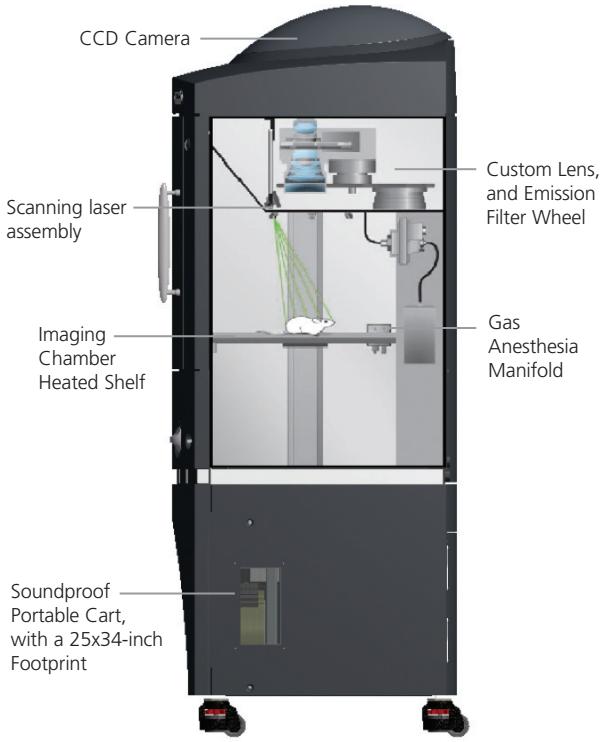
- Light-tight imaging chamber
- Heavy-duty castors
- Integrated gas anesthesia
- LED lamps for photographic images
- Heated stage to maintain optimum body temperature
- Electromagnetic door latch
- Motor-controlled stage, filter wheel, lens position, and f-stop
- Scanning laser for mouse alignment and surface topography

CCD Camera

- Back-thinned, back-illuminated grade 1 CCD provides high quantum efficiency over the entire visible to near-infrared spectrum
- 13.5 micron pixels, 2048 x 2048
- 16-bit digitizer delivers broad dynamic range
- CCD is thermoelectrically (Peltier) cooled to -90 °C, ensuring low dark current and low noise

Custom-Designed Lens

- 6-inch diameter optics, f/1– f/8
- High-resolution – down to 20 microns



The Spectrum Series platform is tailored to your workflow and is available in three models: IVIS SpectrumBL, IVIS Spectrum and IVIS SpectrumCT

Features	IVIS SpectrumBL	IVIS Spectrum	IVIS SpectrumCT
Animal Capacity	10 mice	5 mice	5 mice
Bioluminescence	✓	✓	✓
Fluorescence		✓	✓
Full Spectral Tunability		✓	✓
Epi-Illumination		✓	✓
Trans-Illumination		✓	✓
3D Fluorescence Tomography		✓	✓
3D Bioluminescence Tomography	✓	✓	✓
Quantification	✓	✓	✓
Absolute Calibration	✓	✓	✓
3D Multimodal Co-Registration (PET, CT, MRI)	✓*	✓	✓
Integrated X-Ray and microCT			✓
Compute Pure Spectrum - Spectral Unmixing		✓	✓
Optimized NIR Excitation Lightsource	N/A	Extended NIR Range 150W Tungsten EKE	
Detector type		1" Back-thinned, back-illuminated Grade 1 CCD	
Camera Temp		-90°C	
Imaging Pixels		2048 x 2048	
Accessory Line		Isolation chamber, Anesthesia, calibration tools, phantom mice, Multimodality Software and Mouse Imaging shuttle, DyCE Imaging, Multi View Imaging	

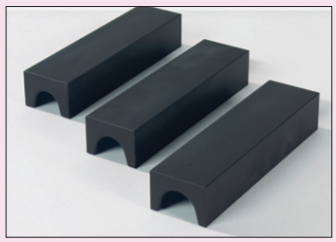
* For bioluminescent reporters, chemiluminescent, and Cerenkov sources only

IVIS SpectrumBL- Complete Imaging Solutions

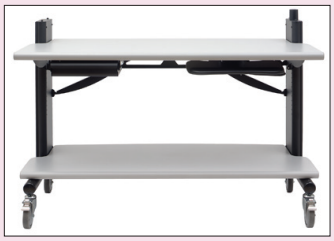
XGI - 8 Anesthesia System
Cat No. 118918

Animal Isolation Chamber Kit XIC - 3
Cat No. 123997

Mouse Imaging Shuttle
Cat No. 127744



Animal Shield Kit XAS-3
Cat No. 119002



XWS - 260 Workbench
Cat No. 119207

IVIS Syringe Injection System
Cat No. 124633

Luciferin
Luciferase Cell Lines
Lentiviral Particles

Imaging System Components Specifications	
Heated Chamber	Yes
Gas Anesthesia Ports	Yes
Injector Ports	Yes
Imaging Chamber Interior Size	43 x 50 x 60 cm (W x D x H)
Imaging System Space Requirement	203 x 163 x 214 cm (W x D x H)
Power Requirements	20 Amps for 120 VAC or 10 Amps for 230 VAC
Stage Temperature 2	0-40 °C
Computer	Quad Core 2.8 GHz, 12 GB, 1333 MHz DDR3, SDRAM, 2GB NVIDIA Quadro 4000 with 256 CUDA Cores, I TB hard drive, 20" flat screen monitor

Optical Specifications	
Camera Sensor	Back-thinned, back-illuminated Grade 1 CCD
CCD Size	2.7 x 2.7 cm
Imaging Pixels	2048 x 2048
Quantum Efficiency	> 85% 500-700 nm; > 30% 400-900 nm
Pixel Size	13.5 microns
Min. Detectable Radiance	70 photons/s/sr/cm2
Min. Field of View (FOV)	3.9 x 3.9 cm
Max. Field of View (FOV)	23 x 23 cm
Min. Image Pixel Resolution	20 microns
Lens f/1 – f/8	1.5x, 2.5x, 5x, 8.7x magnifications
Read Noise	< 3 electrons for bin=1,2,4; < 5 electrons for bin=8,16
Dark Current (Typical)	< 100 electrons/s/cm2
3D Tomography Software	Included (Bioluminescent reporters only)
CCD Operating Temperature	-90 °C

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

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