

Integrated premier optical imaging and low-dose MicroCT

Key features

- Integrated optical and microCT technology
- 3D optical tomography for fluorescence and bioluminescence
- The industry's most sensitive detection technology ideal for:
 - Bioluminescence
 - Multispectral fluorescence and spectral unmixing
 - Cerenkov imaging for optical radiotracer imaging
- Low dose and ultra fast microCT
- DyCE™ dynamic enhanced imaging for real time distribution studies of both fluorochromes or PET tracers ideal for PK/PD applications

Abstract

The IVIS® SpectrumCT expands upon the versatility and advanced optical feature sets of the IVIS platform integrated with low dose microCT to support longitudinal imaging. The IVIS SpectrumCT enables simultaneous molecular and anatomical longitudinal studies, providing researchers with essential insights into complex biological systems in small animal models. The constant horizontal gantry motion and the flat panel detector provide unparalleled performance for low-dose imaging and automated optical and microCT integration. The stable revolving animal platform table rotates 360° to acquire full 3D data. Multiple animals can be scanned simultaneously while maintaining an average dose per scan at about 13mGy, with a scanning and reconstruction time of less than a minute. Optical and microCT modalities can also operate independently.

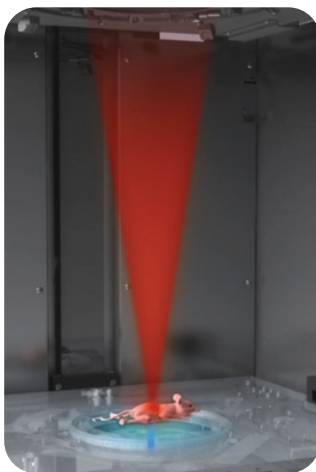
Topographic data is essential for the accuracy of 3D tomographic reconstructions, and the IVIS SpectrumCT's unique surface mapping allows for true topographic surface mapping of the animal. In addition, the intuitive workflow and imaging wizard features facilitate procedures for 3D tomography and 2D screening modes in bioluminescence, fluorescence and Cerenkov luminescence.

IVIS SpectrumCT

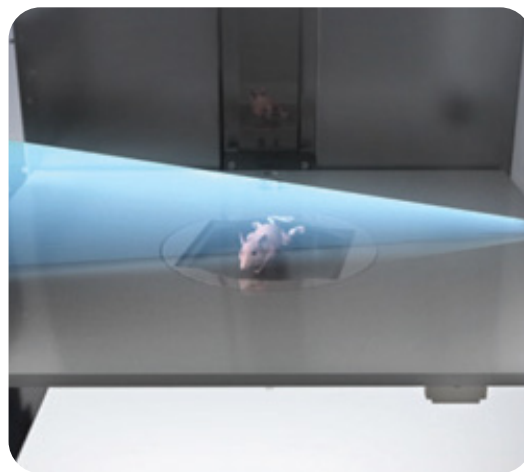


Living Image® Software Simplifies Imaging

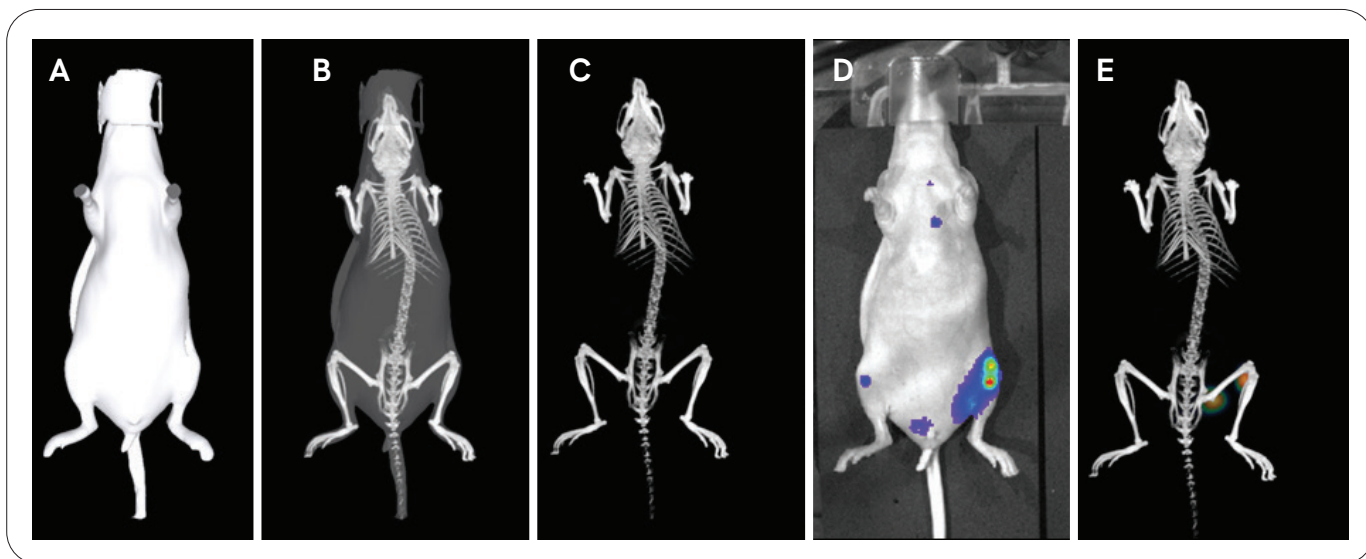
Living Image software is designed to simplify advanced and complex biological models by intuitively guiding the user in experimental setup and analysis. The IVIS SpectrumCT automates the complete workflow from image acquisition and reconstruction to co-registration. The Living Image software offers tools for integrating modalities, quantitation, data export and video development.



Trans-illumination for 3D fluorescence tomography.



Horizontal gantry microCT design with rotating stage.

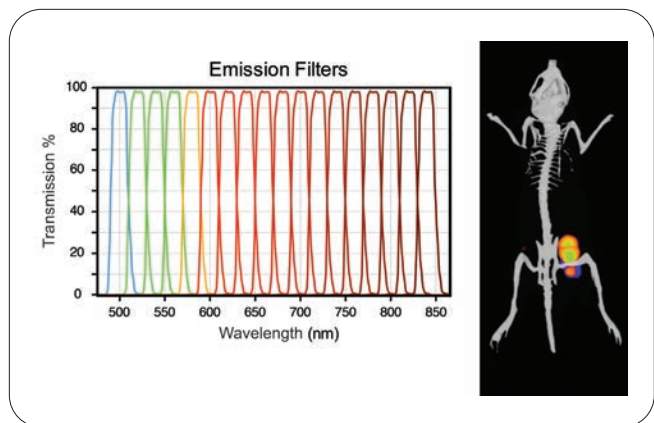


A) Surface topography mapping; B) Computed tomography; C) Computed tomography-segmentation; D) Optical scanning; E) 3D optical tomographic reconstruction and co-registration.

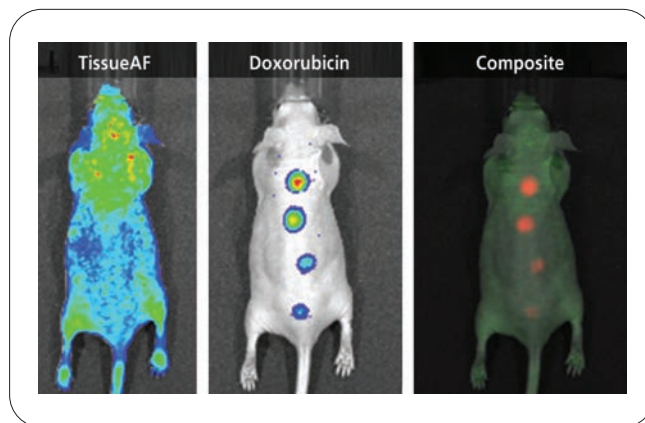
Full-featured Quantitative Fluorescence

Take full advantage of complete 2D and 3D fluorescence tools to pinpoint specific fluorochromes deep within an animal. 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. Fluorescence imaging can be performed in high-throughput epi-illumination mode or trans-illumination mode to enable deep tissue source detection and quantitation.



Spectrum coverage of IVIS's 18 high spectral resolution filter sets. Dual fluorescent co-registration of PC3M prostate tumor expressing red fluorescent protein and targeted with a fluorescent probe at 750 nm.

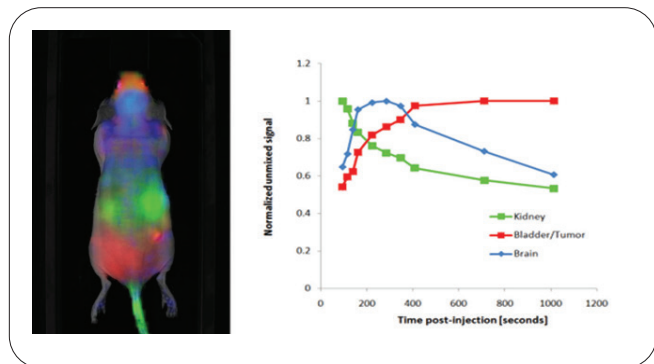


Spectral unmixing of doxorubicin, detection of 256, 128, 64 and 32 ng/10 μ L down the spine.

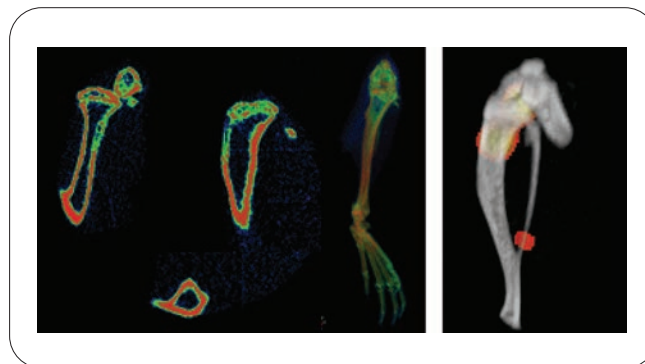
Molecular and anatomical insights into complex biological systems

IVIS SpectrumCT offers bioluminescent, Cerenkov and fluorescent imaging for true quantitative and calibrated analysis of optical data. With exquisitely sensitive and unique optical detection technology and spectral unmixing, the IVIS SpectrumCT can identify very small optical sources within an animal. Additionally, Cerenkov luminescence enables the optical detection of positron emission tracers enabling translational pharmacodynamic and pharmacokinetic studies.

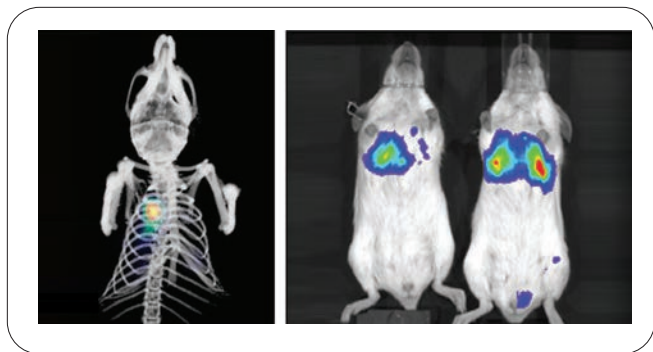
From high-throughput optical screening of 10 mice simultaneously to intricate complex animal modeling, the IVIS SpectrumCT offers imaging solutions for a comprehensive array of applications within biomedical areas including oncology, infectious diseases, musculo-skeletal, cardiovascular, neurology and respiratory research. New to the entire IVIS line of imaging systems, Revvity has introduced Dynamic Contrast Enhancement (DyCE™) imaging for both fluorescence and luminescence imaging. Perform pharmacokinetic/pharmacodynamic analysis of probe or tracer distribution through organs and targeted pathologies.



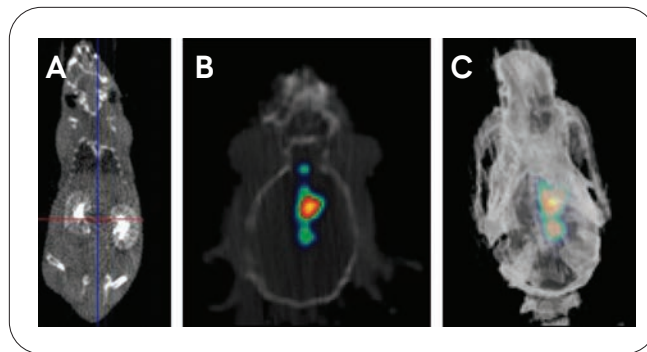
Cerenkov Luminescence: DyCE™, time domain unmixing to quantify 18F-FDG distribution and tumor targeting.



Mouse tibia with an osteolytic lesion.



Lung tumor implantation expressing luciferase.



A) Coronal slice of a mouse injected with Visipaque to identify kidney anatomy; B & C) Co-registered optical and microCT rat glioma model.

Imaging System Components Specifications

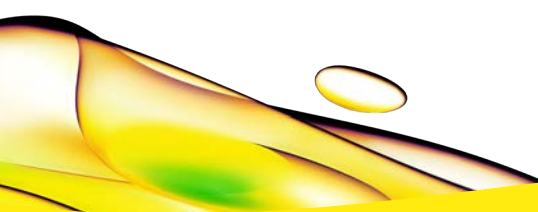
Heated Chamber	Yes
Gas Anesthesia Ports	Yes
Injector Ports	Yes
Imaging Chamber Interior Size	43 x 50 x 60 cm (W x D x H)
Imaging System Space Requirement	203 x 163 x 214 cm (W x D x H)
Power Requirements	20 Amps for 120 VAC or 10 Amps for 230 VAC
Stage Temperature	20-40 °C
Computer	Quad Core 3.6 GHz; 32GB 2666MHz DDR4, RDIMM EEC RAM, Nvidia RTX A4000, 16GB 4DP; 4TB HD; 8x DVD +/-RW ODD; 24" 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. 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/cm ²
Excitation Fluorescence Filters	10
Emission Fluorescence Filters	18
Transillumination Stage	Yes
3D Tomography Software	Included
CCD Operating Temperature	-90 °C

Computed Tomography	
Maximum Energy	Maximum Energy of 50 kV with 1 mA
Focal Spot	50 μm
X-ray Detector	CMOS
Detector Size	3072 x 864 pixels
Detector ADC Bit Depth	14 bits
Detector Operating Temp. Range	10-40 °C
μCT Field of View	120 x 120 x 30 (L x W x H, mm) to 20 x 20 x 20 (L x W x H, mm)
Voxel Size	40 μm – 300 μm
Standard Scan Time	3.6 to 72 seconds
Standard Reconstruction Time	40 to 150 seconds
Standard Scan Dose	minimum of ~13 mGy
Limiting Resolution (3% MTF)	150 μm
Safety Requirements	Less than 1 μSevert /hour max exposure at 5 cm from anywhere outside cabinet, FDA and TUV approved
Software	5 seats (1 acquisition and 4 processing) Automated co-registration along with tertiary registration. Advanced visualizaton and 3D analysis tools for longitudinal μCT applications. Segmentation, data processing and transfer enabled for both PC and Macintosh®

For research use only. Not for use in diagnostic procedures.



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