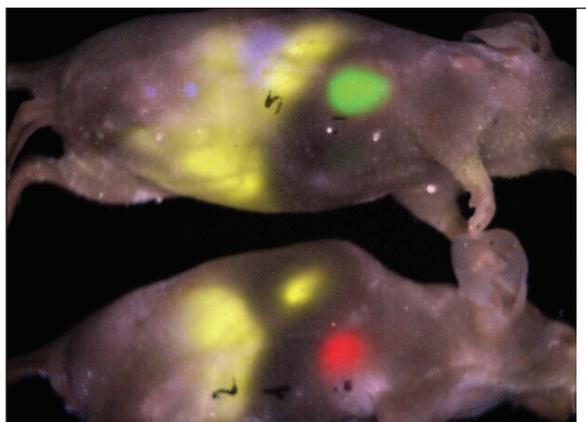


Maestro | In Vivo Imaging Systems

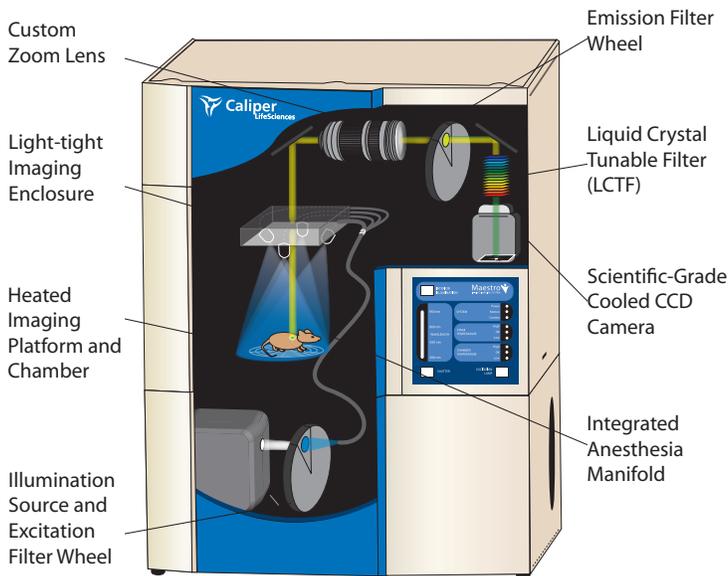
Setting the standard for optical in vivo imaging

Because of its advanced tunable wavelength selection and multispectral imaging software algorithms, Maestro lets you easily and quickly image and quantify one or more fluorophores emitting from the green to the near-infrared. Maestro has been used to successfully separate up to five overlapping fluorophores from autofluorescence. In addition, Maestro is one of the fastest small animal imaging systems, requiring only 5 to 10 seconds to acquire a full multispectral image, or 10 frames per second for a monochrome image.



By separating skin and food autofluorescence and unmixing three fluorophores in these test mice, Maestro provides a high-contrast image showing a composite image of five unmixed components.

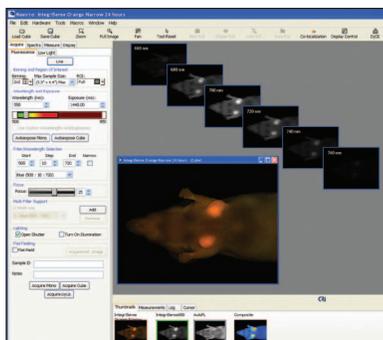
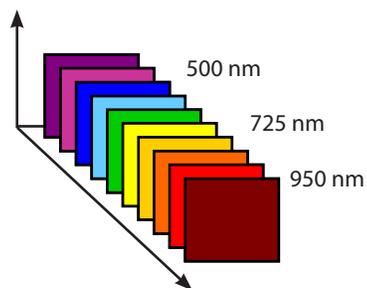
Inside Maestro 2



Maestro Workflow *an easy 3-step process*

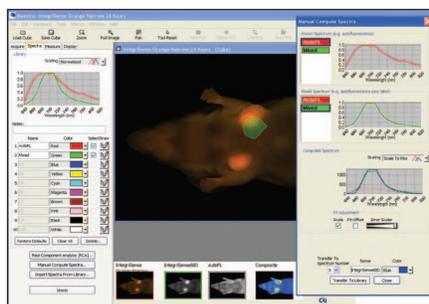
Image.

Automated multispectral image acquisition from 500 to 950 nm, in user-defined steps as fine as 2 nm within seconds. Acquire a full multispectral dataset (23 wavelength-images) in less than 10 seconds.



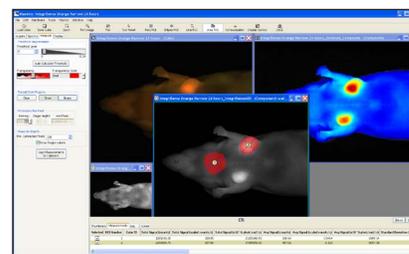
Unmix.

Quantitative spectral unmixing in a single mouse click automatically following acquisition. Easy-to-use and powerful CPS™ (Compute Pure Spectrum) and RCA™ (Real Component Analysis) spectral library generation tools ensure accurate autofluorescence removal and fluorophore quantitation.



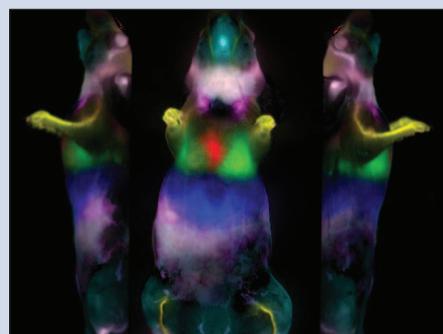
Analyze.

Extract calibrated intensity data for each unmixed fluorophore from user-defined regions-of-interest for easy and accurate quantitation of unmixed signals for accurate comparative analyses. Data and images can be exported to spreadsheets and other analysis programs for easy reporting.



Multiple Views

Easily view 3 sides of an animal simultaneously using Maestro's C3 Mirror Accessory to improve the visibility of fluorophore distribution.



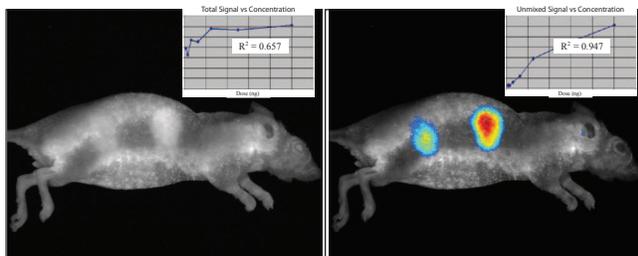
DyCE composite image of bolus NIR dye. Image courtesy E Hillman, Columbia University

Accurate Quantitation

A signal must be pure before it can be quantified. Maestro is the only system that utilizes patented Compute Pure Spectra (CPS™) technology for robust autofluorescence removal, pure spectral unmixing and fluorescence quantitation. Proper spectral unmixing is essential to accurately measuring biological expression when the signal is masked by autofluorescence or overlaps with another fluorophore.

Monochrome

Maestro



Images and data acquired from 4 mice, each with a known amount of doxorubicin (DOX): 1000, 500, 250, 125, 62.5, 31.25, 15.63, and 7.18 ng. On the left, a monochrome image of a mouse with 31.25 and 62.5 ng of DOX at the peak fluorescence emission wavelength. On the right, a Maestro composite image taken of the same mouse. The improved linearity of response and quantitative accuracy obtained by Maestro can be seen in the two graphs comparing signal intensity to concentration.

Adjustable Imaging Area

Maestro can image up to 3 whole mice simultaneously or zoom down to 25 microns per pixel for near-single-cell resolution, offering a more comprehensive look at your mice. Incorporating Caliper’s Nuance multispectral imaging system onto any of your microscopes enables *ex vivo* validation of *in vivo* results using the same multispectral imaging technology.

Maestro leads the industry in enabling the following applications:

- Kinetic imaging and analysis of temporal changes in biodistribution of markers
- Imaging of green fluorophores against a strong autofluorescent background
- Multiplexing up to 5 fluorescent markers in a single animal
- Imaging three whole mice or zooming down to high resolution at 25 microns/pixel
- Accurate quantitation of fluorophores even when autofluorescence is present



Maestro In Vivo Imaging Systems		
	Maestro EX	Maestro 2
Filter Selection	Manual	Automated
Stage Adjustment	Manual	Automated
Light-Tight Chamber	✔	✔
Nosecone Anesthesia Delivery	✔	✔
Heated Stage	✔	✔
Heated Chamber		✔
Wavelength Range	500 - 950 nm, tunable	500 - 950 nm, tunable
Fluorophores	Any emitting beyond 500 nm	Any emitting beyond 500 nm
Bandwidth Selections	20 and 40 nm	20 and 40 nm
Min Wavelength Spacing	2 nm	2 nm
Fluorescence Sensitivity*	300x	300x
CCD / Cooling	Sony ICX285 / 0°C	Sony ICX285 / 0°C
Spatial Resolution	25 micron/pixel	25 micron/pixel
Max Field-of-View	Up to 3 whole mice	Up to 3 whole mice
Typical Multispectral Acquisition Time**	2 - 10 sec/dataset	2 - 10 sec/dataset
Max Monochrome Frame Rate	10 frames/s	10 frames/s
Max Exposure Time	10 min	20 min
Anatomic Organ and Kinetic Imaging	Available with DyCE	Available with DyCE

* Maximum sensitivity increase over standard monochrome imaging methods.

** An example full dataset is 23 images from 500 to 720 nm in 10 nm steps.

Multimodal Imaging

The Maestro system can be used for fluorescence and low-light imaging. In addition, Caliper’s patented time-based DyCE™ kinetic imaging approach can capture all-optical anatomic images of your animal, monitor the pharmacokinetic uptake and wash-out of agents, or isolate fluorescent signal from accumulating specifically bound agents from the general background of non-specific or blood-pool signals.



DyCE image of cerebellum obtained from analysis following tail-vein ICG injection.

A Complete Product Portfolio

Maestro EX



A manually operated entry-level *in vivo* spectral imaging system with all of the sensitivity and speed of the award-winning Maestro product line.

Maestro 2



A fully automated *in vivo* spectral imaging system for consistent results and ease-of-use, ideal for multi-user facilities and high-throughput applications.

Maestro Kinetic



Generate real-time images of temporal biodistribution and biological activity in order to record fluorescence probes as they actively move through the living animal. Similar to kinetic PET, the Maestro Kinetic produces high-resolution time-resolved data that can be assessed quantitatively, and free from autofluorescence.

Anesthesia System



Anesthesia systems come with Portable Anesthesia Machines (PAM), including an Isotec 3 vaporizer, tank regulator, mouse induction chamber, and dual diverter manifold. Maestro systems come standard with a Nosecone/Heated Stage accessory that is a combined controlled heated stage and non-rebreathing nosecone system. Vaporizer sold separately.

"We have used Maestro for multiple investigations ranging from monitoring tumor growth to assessing biodistribution of adenovirus, labeled antibodies and quantum dots. The robust spectral unmixing capability gives us confidence in the validity of even weak signals against autofluorescence and competing agents."

Dr. Ralph Mason, The University of Texas Southwestern Medical Center

Photography Credits • Bone scan of a normal living mouse measured using Maestro. Bony elements (green) are visualized with the near-infrared fluorescent probe Osteosense-680 (VisEn Medical). Kidneys (blue) are visualized using another near-infrared fluorescent probe emitting at 800 nm. Autofluorescence of food in the intestine is seen in red. image courtesy Clemens Lowik, Ivo Que, Eric Kajzel, Andy Waters, Blandine Franke-Fayard and Chris Janse, Leiden University Medical Center