

Pearl[®] Trilogy

Near-Infrared Fluorescent and Bioluminescent
Small Animal Imaging System



LI-COR[®]



Pearl® Trilogy

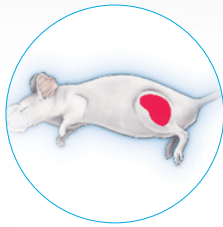
Small Animal Imaging System For Near-Infrared Fluorescent And Bioluminescent Optical Imaging

An affordable solution that's delivering data trusted by researchers around the globe.

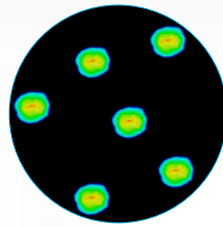
Pearl Trilogy Imaging System is a small animal near-infrared fluorescent and bioluminescent optical imaging system. At the heart of the Pearl Trilogy is revolutionary FieldBrite™ Xi² technology.

This innovative approach to imaging allows you to detect smaller and deeper targets accurately in a single acquisition, without having to worry about saturation or the need to adjust images.

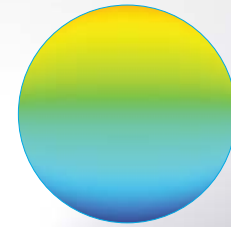
Combined with intuitive and easy to use Image Studio™ software, the Pearl Trilogy quickly becomes the favorite system in any lab, regardless of experience level.



Exceptional sensitivity



Uniform illumination



Wide dynamic range



**With FieldBrite™ Xi² Technology,
It's Easier To:**

- ✓ Capture images
- ✓ Normalize your data
- ✓ Analyze your data

Pearl® Trilogy uses FieldBrite Xi² technology to deliver the clear and accurate data you can rely on to help move your research forward. Because you use the same camera settings for every image, visual representation of changes in target size are more accurate.

FieldBrite™ Xi² Technology

- Uniform Illumination
- Exceptional Sensitivity
- Wide Dynamic Range

FieldBrite Xi² technology is the heart of the Pearl® Trilogy Imaging System. FieldBrite Xi² is specifically optimized for small animal imaging. This attention to detail ensures you have the highest quality data possible.

FieldBrite Xi²:

- Ensures the entire fluorescent imaging area has uniform illumination so you can accurately monitor even the smallest changes
- For fluorescent imaging, uses infrared lasers to obtain the best signal-to-noise ratios possible and enables the detection of targets deep within the animal (Fig. 1)
- For both fluorescent and bioluminescent imaging, features an industry-leading 6 logs of dynamic range, so you never get saturated signal, which allows you to image all mice under the same optical conditions

Uniform Illumination

Reproducibility is critical for your research. And because many of your studies will be performed longitudinally, changes seen must reflect the biological changes of your experiment, not the limitations of your optical system.

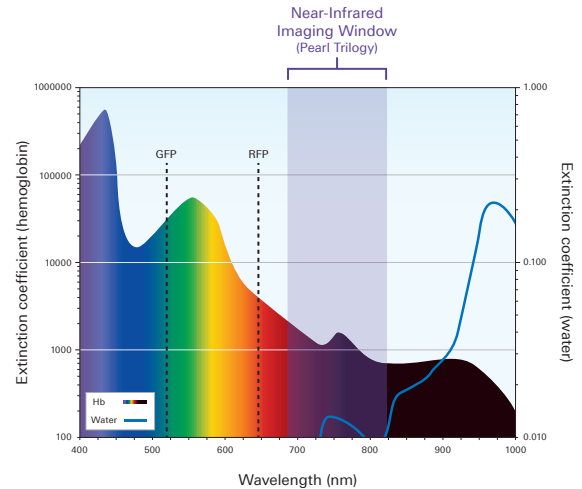


Figure 1. Hemoglobin (Hb) and other tissue components strongly absorb visible light. In the near-infrared region, tissue absorbance is dramatically reduced. Above 820 nm, light absorbance by water begins to increase.

FieldBrite Xi² gives uniform fluorescent illumination across the entire imaging area for this exceptional reproducibility (CV <3%). The laser illumination is stable throughout the course of your study – meaning any changes you see are based upon true biological phenomena (Fig 2).

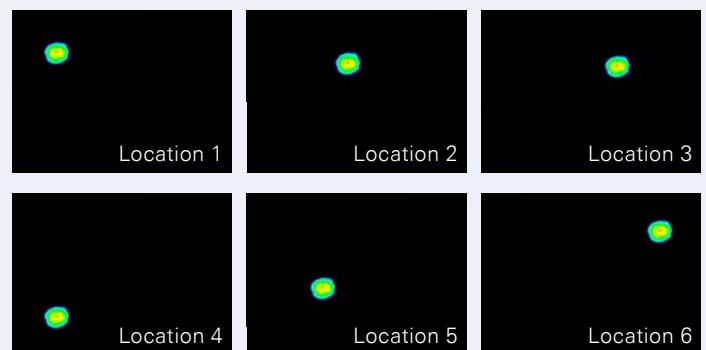
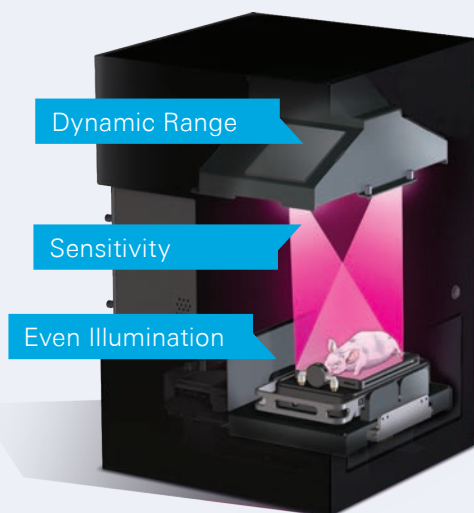


Figure 2. A mouse organ (brain) was imaged 6x in variable locations using FieldBrite Xi² technology. The CV is <3% across the entire field of view.

Exceptional Sensitivity

Animal tissue strongly absorbs visible light, which prevents the light from reaching deeper targets (Fig. 3). In addition, animal tissue has high autofluorescence when imaged in visible wavelengths ($\leq 650\text{ nm}$) which leads to poor Signal/Noise (S/N) ratios and poor limits of detection (Fig. 4).

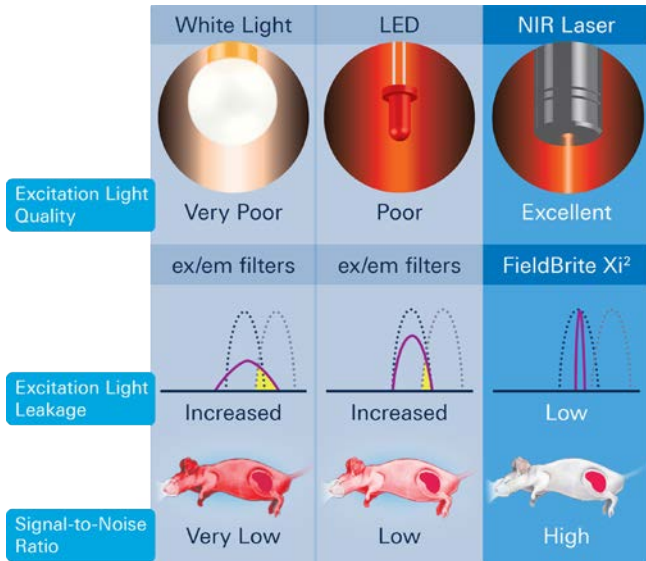


Figure 3. Improved performance with FieldBrite Xi² optics.

A) NIR laser delivers excitation light in the narrow wavelength band desired, unlike LED or white light sources. B) Leakage of excitation light (yellow shading) increases image background. C) Proprietary FieldBrite Xi² filtering technology dramatically reduces excitation light leakage, for decreased image background and earlier detection of small or deep targets.

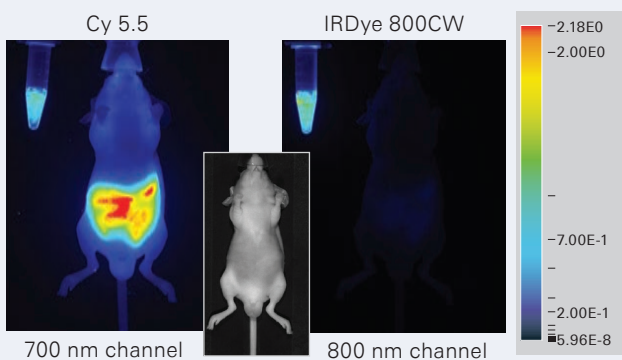


Figure 4. Autofluorescence is nearly eliminated at 800 nm. Untreated nude mouse was imaged at 700 nm and 800 nm for tissue autofluorescence. Tubes of fluorescent dye (Cy[®] 5.5 or IRDye[®] 800CW) are shown in the upper left; white light image is shown (inset). At 700 nm, strong autofluorescence is contributed by plant material in the digestive tract. In contrast, the 800 nm image shows extremely low autofluorescence.

Your solution is to image in the near-infrared (NIR) fluorescent imaging window (680 nm – 820 nm). FieldBrite Xi² optics ensure deep penetration of the tissue and also ensure the very best S/N ratios for the very best sensitivity.

FieldBrite Xi² technology ensures the Pearl® Trilogy is sensitive enough to detect the small or deep tumors in your animal that are not yet palpable, both subcutaneous and orthotopic. Less probe is needed, making your experiments more cost effective.

Wide Dynamic Range

Dynamic range is critical in small animal imaging, because signal will vary by multiple logs between animals and/or across a longitudinal study with many animals. The 6-log dynamic range of FieldBrite Xi² technology ensures the capture of pure data containing no saturation, allowing you to use the same camera settings for every image you acquire. Thanks to FieldBrite Xi², you are now able to accurately and reliably compare and quantify changes across your entire study (Fig. 5).

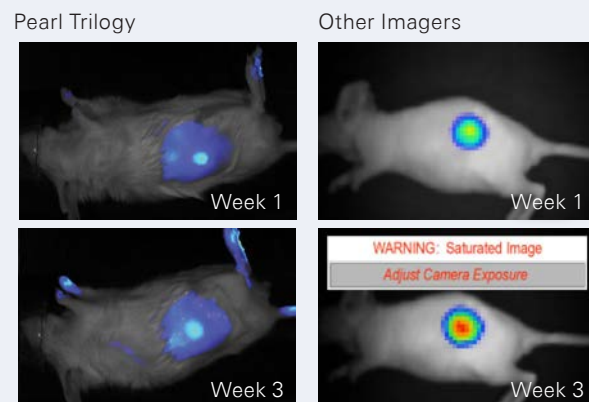


Figure 5. As tumors grow over the course of a study, other imaging systems require adjustments to camera settings to account for saturation of signal. FieldBrite Xi², with more than 6 logs of dynamic range, does not saturate, allowing the same camera settings to be used for all imaging.



Build Your System to Your Needs

There are many ways to expand the Pearl® Trilogy Small Animal Imaging System to provide expanded versatility to your lab.

Both IRDye infrared dyes and BrightSite™ Imaging Agents ensure you will get the optimal sensitivity and performance with your *in vivo* imaging experiments. The Odyssey CLx Infrared Imaging System allows you

to include plate-based assays, tissue sections, and a variety of other traditional lab techniques – all using the same dyes and agents being used in your animals.

And to ensure safe and efficient imaging, the SmartFlow Anesthesia accessories are optimized for use with the Pearl Trilogy and related imaging accessories.



Pearl Trilogy + Reagents



+ SmartFlow Anesthesia Suite



+ Odyssey® CLx Imager



Pearl® Trilogy + Reagents

The Pearl Trilogy Imager makes *in vivo* imaging accessible and highly successful for researchers, whether they are experts or new to small animal imaging.

When coupled with BrightSite™ NIR fluorescent optical probes, you can target tumors, bone, lymphatics, and more. These probes are sensitive enough for small or deep targets and are ready-to-use when you receive them.

+ SmartFlow Anesthesia Suite

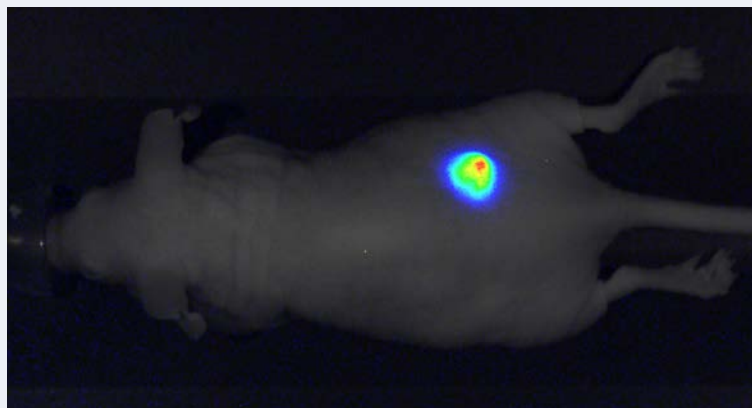
The SmartFlow Anesthesia Suite offers inhalation anesthesia that provides the safest, most effective form of anesthesia. Among the benefits, it reduces the likelihood of animal loss and maintains a consistent plane of anesthesia through the duration of your work.

+ Odyssey® CLx Imager

The Odyssey CLx Imager helps you to validate your research and allows you to take your work from the cell level, then on to the animal with the Pearl Trilogy Small Animal Imager. Work with a wide range of applications, including quantitative NIR Western blots, In-Cell Western™ assays, and protein gel imaging.

Applications

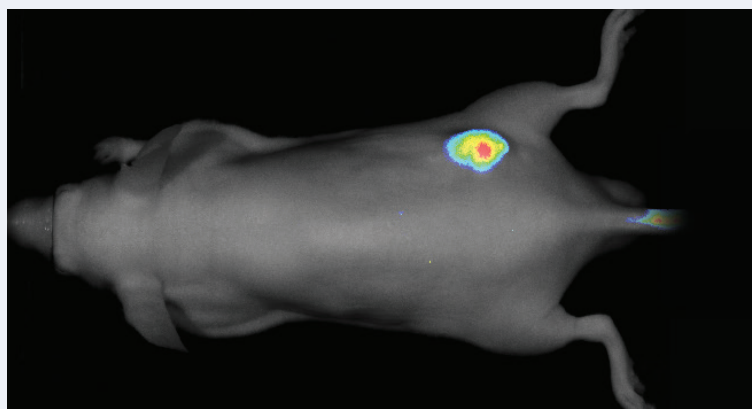
Here are some examples of application profiles that can be performed on the Pearl® Trilogy Small Animal Imaging System.



Bioluminescence

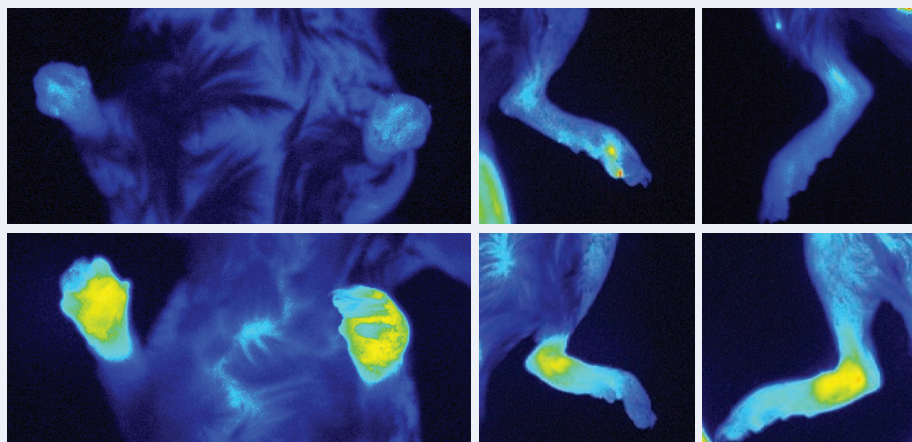
Bioluminescent detection of subcutaneous 4175 (LM2) luc + human triple negative breast cancer cell line in athymic NCR nu/nu mouse.

Image courtesy of Michael Chiorazzo, Elizabeth Browning and Jim Delikatny, Small Animal Imaging Facility, University of Pennsylvania.



Fluorescence

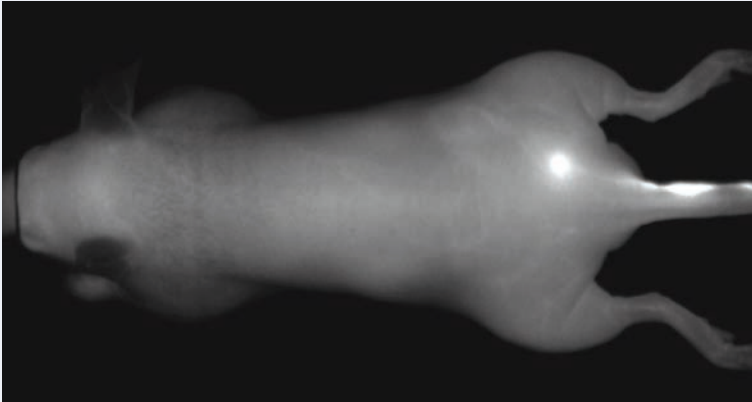
A subcutaneous tumor derived from a prostate cancer cell line that overexpresses the EGF receptor (EGFR) was detected using IRDye® 800CW EGF probe.



Arthritis and Inflammation Imaging

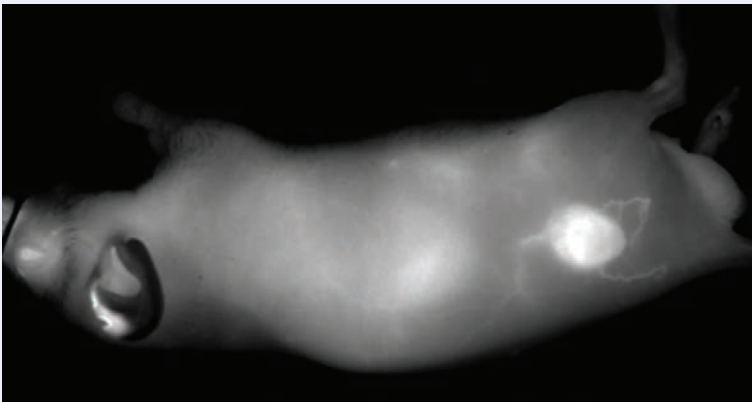
Arthritis imaging with IRDye 800CW 2-DG in DBA Collagen antibody-induced arthritis model. Uninduced and induced animals were injected with IRDye 800CW 2-DG probe. Probe was retained in affected areas (feet and ankles) of induced animal.

Courtesy of Dr. Andrea Augello (De Bari lab, Musculoskeletal Programme, Institute of Medical Sciences, University of Aberdeen, UK).



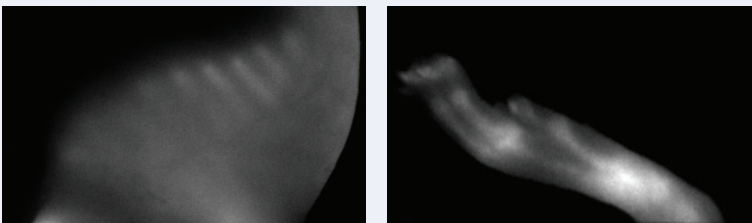
Lymphatic Targeting

Lymph tracking with IRDye® 800CW PEG after intradermal injection on right side of tail. Draining of agent to sciatic lymph node is detected.



Vasculature Imaging

Tumor vasculature imaged with IRDye 800CW PEG. Images were captured 3.5h after IV injection. Large blood vessels and tumor are visible in nude mouse.



Bone Imaging

Imaging of skeletal details with IRDye 680 BoneTag™ agent. Spine, ribs, and foot of nude mouse were imaged at 85 μm resolution.

Specifications

- **Detector Type:**
CCD. Thermoelectrically cooled
 - **700 nm Channel:**
Excitation 685nm, Emission 720nm
 - **800 nm Channel:**
Excitation 785nm, Emission 820nm
 - **Bioluminescent Channel:**
Excitation, NA, Emission 450nm - 640nm
 - **White Channel:**
Excitation white, Emission, NA
 - **Dyes:**
IRDye® 680RD, IRDye 700DX, IRDye 800RS, IRDye 800CW, Alexa Fluor 680, Alexa Fluor 790, and Cy® 5.5
 - **Resolution:**
85, 170, or 255 micron
 - **Image Display Options:**
Pseudocolor, grayscale, single color (red, green, or blue), or two colors with overlapping fluorescence displayed in a third color
 - **Capacity:**
One animal, with linked Lookup tables for image normalization
 - **Imaging Bed:**
16.8 cm W x 12 cm D (6.6" W x 4.75" D). Vertical clearance to top of drawer is 3.8 cm (1.5")
 - **Field of View:**
11.2 cm W x 8.4 cm D (4.4" W x 3.3" D) at surface of imaging bed
- Imaging Bed Temperature Range:**
32-42 °C



LI-COR is honored to receive this prestigious award. Learn more at www.licor.com/frostsullivan.

LI-COR Biosciences

Global Headquarters

Serving the United States
4647 Superior Street
Lincoln, NE 68504
Phone: +1-402-467-0700
Toll free: 800-645-4267
Fax: +1-402-467-0819
biosales@licor.com

Distributor Network:

www.licor.com/bio/distributors

- **Gas Anesthesia:**
Inlet and outlet ports flow anesthesia gas through a nose cone in the imaging drawer. A rotameter is included for flow rate control
- **Acquisition Speed:**
500ms - 60 seconds
- **Size:**
41 W x 41 D x 66 cm H (16" W x 16" D x 26" H). Depth with imaging drawer open is 63.5 cm (25")
- **Weight:**
23 kg (50 lb)



Regional Offices

LI-COR GmbH, Germany
Serving Europe, Africa, and the Middle East.
 LI-COR Biosciences GmbH
 Siemensstraße 25A
 61352 Bad Homburg
 Germany
 Phone: +49 (0) 6172 17 17 771
 Fax: +49 (0) 6172 17 17 799
 bio-eu@licor.com

LI-COR Ltd., United Kingdom
Serving Denmark, Finland, Iceland, Ireland, Norway, Sweden, and UK.
 LI-COR Biosciences UK Ltd.
 St. John's Innovation Centre
 Cowley Road
 Cambridge
 CB4 0WS
 United Kingdom
 Phone: +44 (0) 1223 422104
 Fax: +44 (0) 1223 422105
 bio-eu@licor.com

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P/N 980-15278 2/15

The LI-COR board of directors would like to take this opportunity to return thanks to God for His merciful providence in allowing LI-COR to develop and commercialize products, through the collective effort of dedicated employees, that enable the examination of the wonders of His works. "Trust in the LORD with all your heart and do not lean on your own understanding. In all your ways acknowledge Him, and He will make your paths straight." —Proverbs 3:5,6

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