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Reliable molecular imaging of bioluminescence and NIR fluorescence in vivo

In vivo molecular imaging is a powerful tool for non-invasive analysis of cellular and molecular mechanisms. Whole-body optical imaging of small animals is now widely used in preclinical research to explore disease mechanisms, evaluate drug candidates, and monitor the effects of therapy over time. Optical imaging of bioluminescent or fluorescent reporters is a cost-effective, accessible way to examine biological processes in the context of the living animal. Multiple measurements can be made in each animal over time, reducing the number of animals required and minimizing the effects of biological variability.

In bioluminescence imaging (BLI), conversion of substrate by the luciferase enzyme produces light and indicates expression of the reporter gene in the living animal. Sensitivity is high, because external illumination is not needed and animal tissue has low background bioluminescence. Using steady-state imaging, changes in light output can be monitored over time and compared to the initial time point. BLI is used to study tumour growth and metastasis, transplantation, cell trafficking, and patterns of gene expression and regulation.

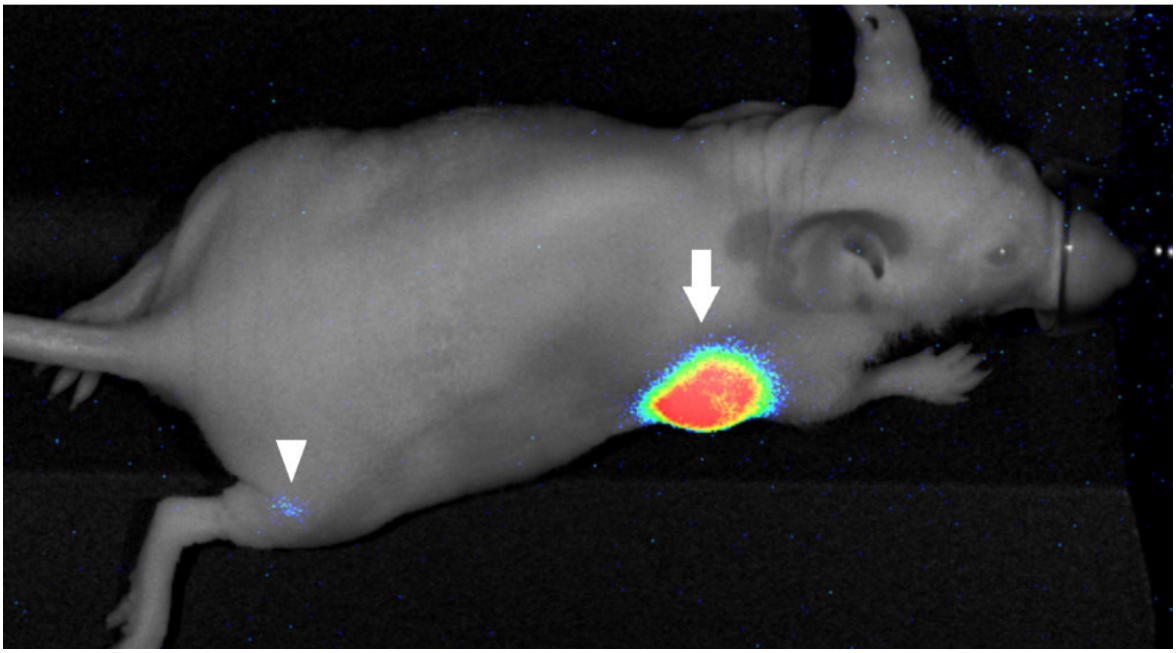

Fig. 1.

Reproducibility is a growing concern in preclinical research. Although optical imaging approaches help to minimize biological variability, the imaging process can be a source of error in BLI. Most optical imaging systems require adjustment and optimization of camera settings. The settings used early in a study may produce saturated images later on, as signals become more intense. Changes in image capture settings

make it difficult to compare images across the entire study. Adjustment of camera settings also causes variability in timing. After substrate injection, animals should be consistently imaged at the peak of the enzymatic reaction. Adjustments and re-imaging delay the experiment and make the timing inconsistent from one animal to the next.

The Pearl® Trilogy Small Animal Imaging System eliminates these inconsistencies. This affordable benchtop imager provides accurate and reliable imaging of bioluminescent signals across 6 logs of dynamic range. Identical camera settings and optical conditions are used for every animal at every time point, with no saturation of strong signals. Consistent timing and image capture settings improve reproducibility and streamline the data analysis for each study. Pearl Trilogy delivers cost-effective, reliable imaging without the downtime and service costs of other BLI imagers. The easy-to-use imager and intuitive Image Studio™ analysis software are satisfying for both new and experienced users.

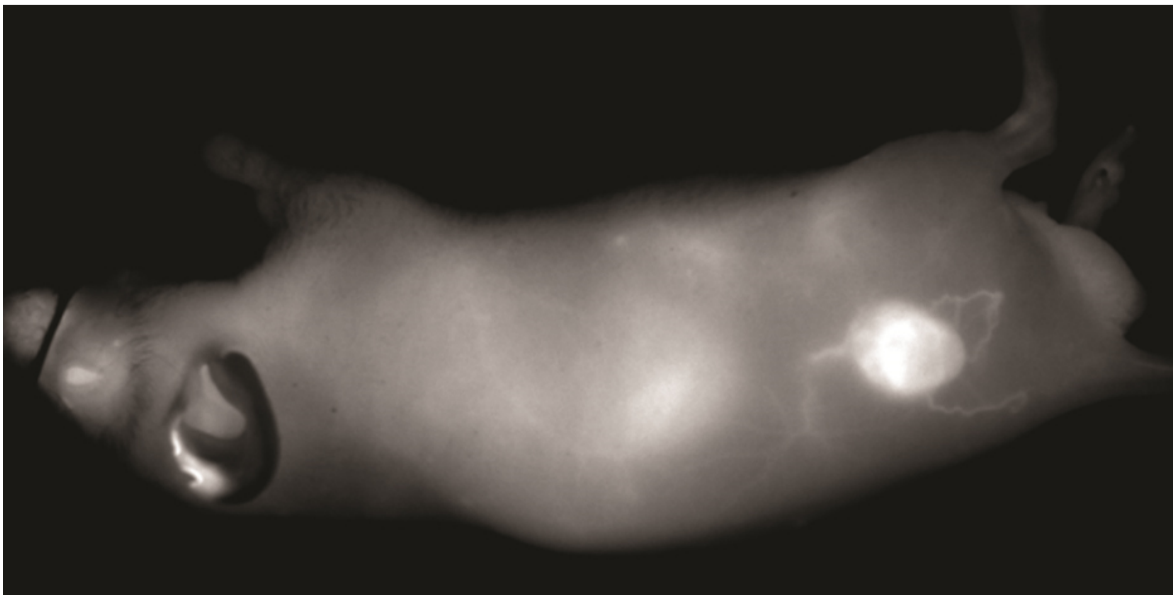

Fig. 2.

In addition to bioluminescence imaging, the Pearl Trilogy system offers high-performance optical imaging of near-infrared (NIR) fluorescent probes. NIR fluorescent optical probes are widely used in pre-clinical and translational research, to target the underlying molecular changes associated with disease. The Pearl Trilogy's FieldBrite Xi2 optical system uses laser excitation and proprietary filtering technology to provide industry-leading sensitivity and image quality for imaging of NIR fluorescent probes. Laser illumination is uniform and stable across the entire imaging field (coefficient of variation <3%). Reliable, reproducible performance and a dynamic range of 6 logs ensure that the changes observed throughout a study reflect actual biological change, not limitations of the optical system.

Bioluminescent and NIR fluorescent reporters are important, complementary tools for optical imaging in preclinical and translational research. The easy-to-use Pearl Trilogy imager delivers reliable, accurate results for both modalities, with consistent image capture settings for every animal at every time point.

Animal support is provided by the temperature-regulated imaging bed and optional SmartFlow gas anesthesia suite. The Pearl Trilogy Imaging System combines reliable performance with ease of use for both bioluminescence and NIR fluorescence optical imaging – making this affordable imager an excellent choice for any pre-clinical research laboratory.

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