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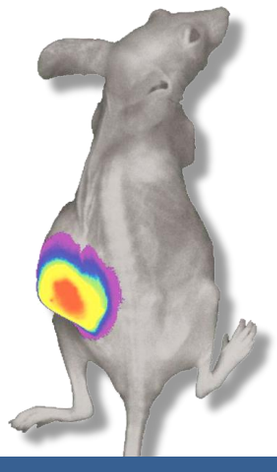
Bio Imaging System



NEO Science

Fluor *i* In Vivo

Fluorescence *In Vivo* Imaging System

Fluor i In Vivo is a fluorescence In Vivo imaging system.

There are two main types of optical In Vivo imaging systems: luminescence and fluorescence.

Firefly luciferase and luciferin are mainly used in Luminescence experiments to label cells and obtain images. The light generated by infected luciferase gene is too weak to see with the naked eye. When this is applied to cells and living animals, greater light loss occurs. To capture images of light with such low brightness, imaging system needs to employ an ultra-high sensitivity image sensor.

In the case of fluorescence, either a fluorescent gene or a fluorescent reagent can be used. Both produce light strong enough to be seen with the naked eye. Due to the nature of fluorescence, there is excitation light and emission light, and images can be obtained and analyzed using the emission light from the fluorescent material. At this time, the excitation light is filtered out using a optical filter, and only the emission light required for imaging is passed through. Fluor i In Vivo can effectively obtain excellent In Vivo images by using filters optimized for In Vivo images.

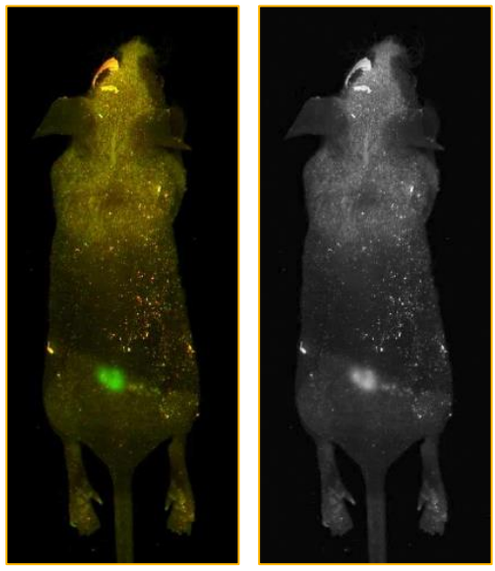
Because luminescent In Vivo imaging devices and fluorescent In Vivo imaging devices have similar yet different principles, key elements such as image sensors and optical filters required for each require different specifications. Therefore, when luminescence and fluorescence are combined into a single device, the product becomes complex and large.

Neo Science manufactures light emitting devices and fluorescent devices separately and faithfully fulfills the functions of each product. And this independent devices simplifies the structure of the product and makes it compact and easy to use and maintain.

Fluor i In Vivo, a fluorescence In Vivo imaging device, can detect most fluorescent substances from blue to NIR and has fast image processing speed. Fluor i In Vivo uses the Defocusing Free HYPER APO lens to capture images for each channel without the need to adjust focus, resulting in clearer image data.

Color Sensor

Fluorescent substances have different colors depending on their wavelength. Imaging devices can capture and analyze images by differentiating between background and fluorescent signals, leveraging the distinctive characteristics of difference color wavelengths. Fluor i In Vivo uses a color sensor rather than a black-and-white sensor to suit the characteristics of these fluorescent substances.



Intuitive data by Fluor i's color sensor.

When it comes to In Vivo images, unlike cases with little or no reflected light and auto-fluorescence, such as in fluorescence microscopy images, a significant background noise issue is encountered. Generally, cells are transparent and thin, whereas experimental animals or plants used in experiments often have colored or opaque surfaces. Consequently, background noise caused by reflected light or auto-fluorescence can occur, serving as an interfering factor in image analysis. If the camera's sensor is black and white, distinguishing between the signal and the background may become challenging, potentially leading to both being mistakenly identified as signals. However, when a color sensor is used, it becomes possible to differentiate between the signal and the background based on color, resulting in the creation of highly intuitive image data. Thus, the position and size of the signal can be readily identified without the need for any additional image processing.

Easy Imaging

Fluor i In Vivo, which is faithful to its fluorescence function, has a simple structure. So it is easy to use and maintain.

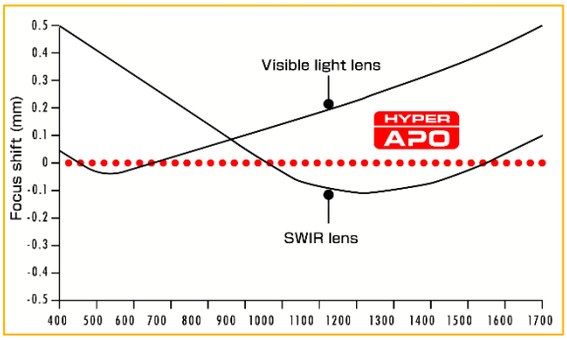
And the user-friendly program allows you to use it proficiently without any special training.

In addition, the simple structure not only shortens the experiment time by speeding up the imaging speed, but also helps the researcher check the image signal without missing it through immediate response.

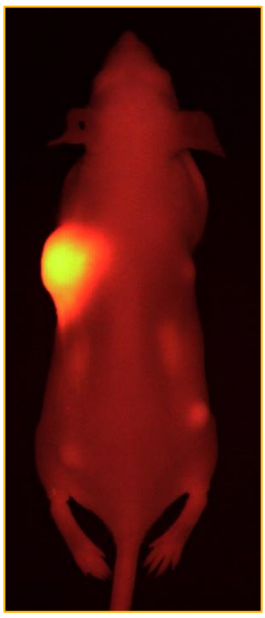
The compact size allows efficient use of laboratory space and makes it easy to move the equipment.

HYPER APO Lens

Light is refracted when it passes from one material to another. And the refractive index varies depending on the wavelength of light. The position where the image is formed may vary depending on the wavelength of the light passing through the lens, due to this phenomenon. Fluor i In Vivo utilizes Hyper Apochromat technology and can provide image data with focus adjustments corrected for each channel. Images can be captured at a consistent focal length across all channels, resulting in clearer image data and ensuring more accurate measurement results.



Ultra-high resolution images from visible light to near-infrared that are always in-focus.



Tumor targeted drug.

DDS (Drug delivery system)

Recently, in the development of new drugs, not only drug efficacy but also targeting is very important. Recently, there has been a significant focus on ensuring that newly developed drugs are precisely targeted to the intended lesion site, delivering their therapeutic effects exclusively to abnormal cells and tissues without impacting normal ones. Although radioactivity can be used to track location, there are many limitations to using radioisotopes and devices in a typical laboratory.

Labeling a newly developed drug with a fluorescent substance and injecting it into a laboratory animal allows you to obtain image data and track its movement using Fluor i In Vivo .

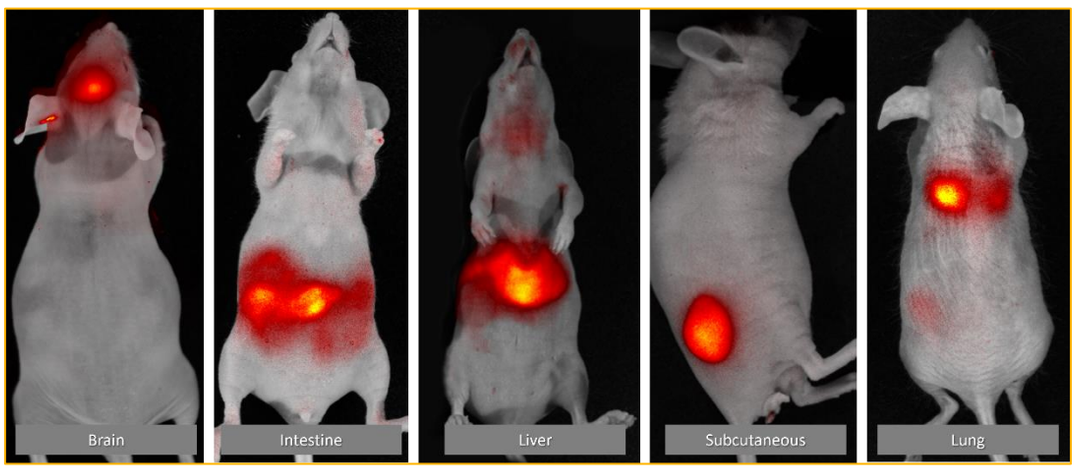
Due to optical limitations, obtaining images of tissues deep inside the animal may not always be possible. In such cases, tracking can be performed using Ex Vivo images. The fluorescence tracked in this way allows for relative quantification by measuring the area and intensity.

Cell tracking (Tumor, Stem cell)

Fluor i In Vivo is also used for cell tracking. Fluorescent genes like GFP can transfected into tumor cells to make a stable cell line. Stable cell lines can be injected into experimental animals to induce tumor formation, and the tumor size can be measured through imaging. In the case of GFP, it has a short wavelength among fluorescent substances and thus has a short transmittance. Therefore, the use of fluorescent genes such as RFP, mCherry, and iRFP which have longer wavelengths is increasing.

Unlike cancer cells, the characteristics of stem cells or immune cells can change when viruses are used, so fluorescent staining dyes are used more often than fluorescent genes. Since these staining reagents can be cytotoxic when used as is, non-toxic substances with excellent labeling ability are being developed using various nanoparticle-like structures.

Fluor i In Vivo can capture images of labeled cancer cells, stem cells, and immune cells and get quantitative data. You can track the cancer growth process and cell migration path.

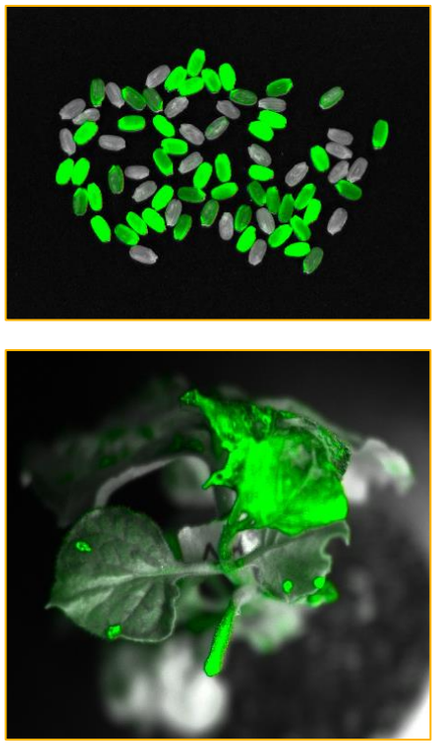


Fluorescence In Vivo Imaging in various tissues.

Plant Fluorescence Imaging

Fluor i In Vivo can be used to monitor the expression of specific genes in plants. Without imaging equipment like Fluor i In Vivo , preparing plant samples into which specific genes have been introduced can be a time-consuming process. After gene transfection, confirming the presence of the gene involves planting seeds, waiting for sprouting, and then using methods like PCR to confirm its existence. Subsequently, when harvested, the plant sample containing the introduced gene is prepared, which can take as long as one plant life cycle.

However, by utilizing fluorescent genes, it becomes possible to visually confirm whether a gene has been introduced, and only the introduced seeds can be promptly selected and tested. Moreover, it is possible to verify gene expression not only in plant seeds but also in specific parts of leaves or stems. Obtaining fluorescence images like GFP in plant leaves can be challenging due to the strong autofluorescence of chlorophyll. Fluor i In Vivo can remove the interference caused by chlorophyll's autofluorescence through optimized filters. This allows for the separation of only the GFP signal, providing clear image and quantitative data.

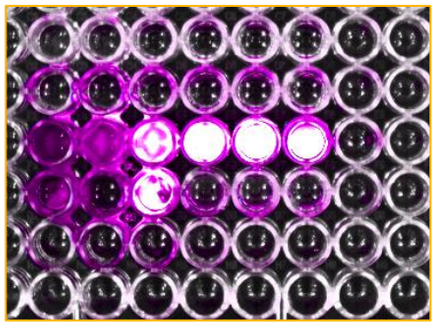


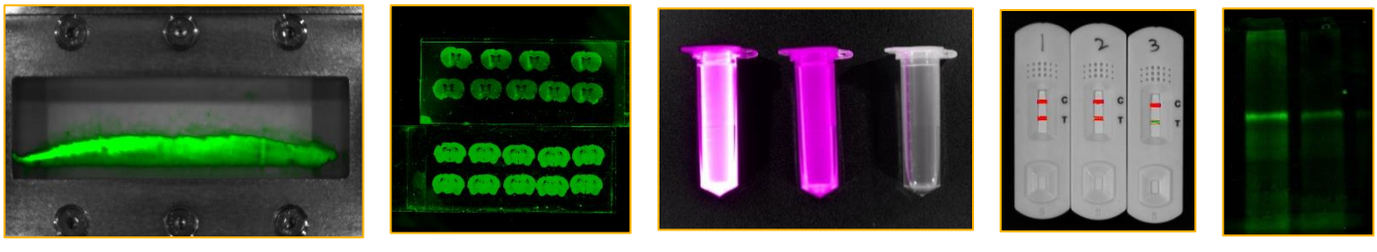
Fluorescence In Vivo Imaging in plant.

Other Fluorescence Imaging

The distinction between Fluor i In Vivo and a fluorescence microscope lies in their magnification functions. This applies to various samples, including drugs, cancer cells, stem cells, and plants. Regardless of the sample type, Fluor i In Vivo allows for the capture of non-magnified fluorescence images, which in turn enables the acquisition of high-quality quantitative data.

Furthermore, microorganisms can be labeled with fluorescence and tracked from the mouth, through the intestines, and all the way to the anus. Specific microorganisms can be labeled with fluorescent dye, mixed with contaminated water, and passed through a developed water purification filter to obtain an image. This process helps gauge the effectiveness of microorganism filtration. Additionally, using POCT's probe as a fluorescent substance, Fluor i In Vivo can provide both images and quantitative data, even for substances with low concentration. Fluorescence images without magnification currently find diverse applications, and it is anticipated that more experiments and applications will emerge in the future.





Fluorescence imaging from various samples.

Optimized Filter

Fluor i In Vivo employs filters optimized for fluorescence In Vivo imaging. This has different characteristics from fluorescence microscopy. When viewing cells under magnification, autofluorescence is rarely a concern. Therefore, by utilizing a filter with a narrow range that closely matches the wavelength of the fluorescent substance, exceptional fluorescence images can be obtained.

NeoScience conducts various filter tests to select the most suitable filter for In Vivo imaging applications. As a result, we can get intuitive, rapid, and clear image data.

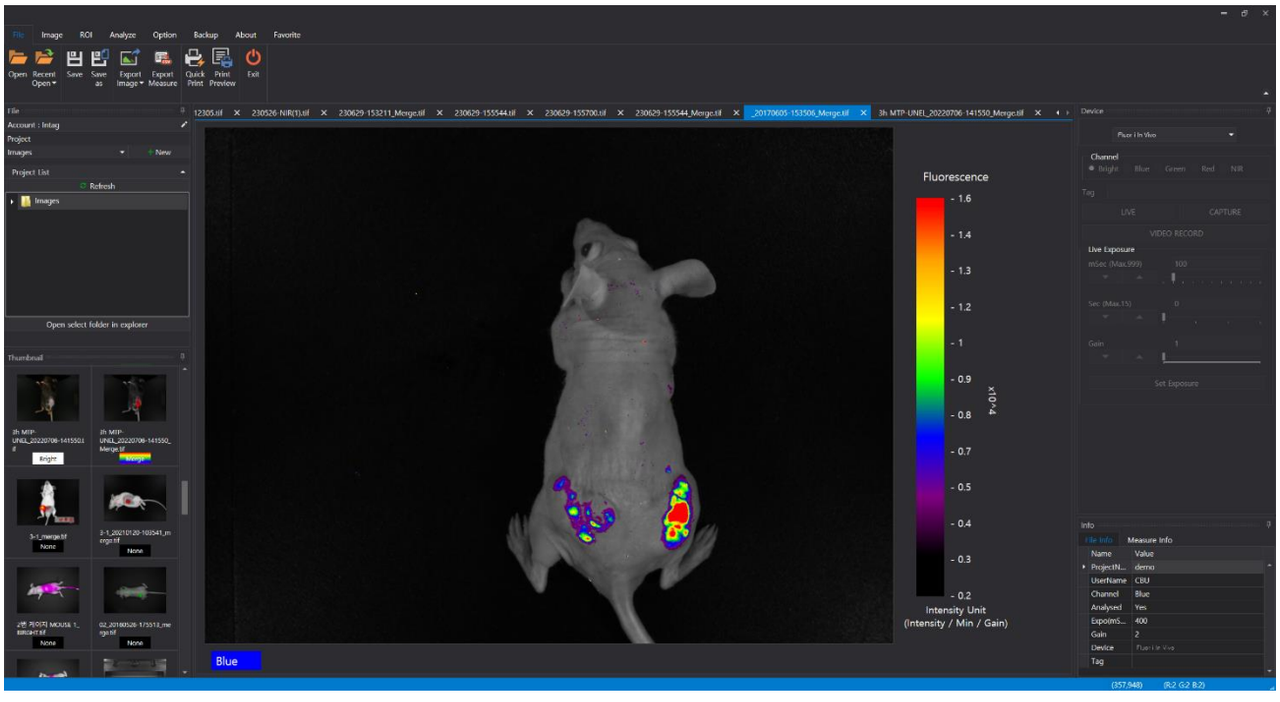
User Friendly Program

Fluor i In Vivo 's program is designed user friendly.

You can monitor the live window and data video through the central panel. The fluorescence intensity can be observed using the scale bar, which is adjustable. This allows for a comparison and analysis of fluorescence intensity with other image data. The scale bar can also be customized with different colors, making it easy to intuitively assess fluorescence intensity.

Device control is accessible through the panel on the right. Depending on the signal strength, exposure time and gain can be adjusted to obtain accurate quantitative values. Basic information about image data can be found in the lower-right panel, along with quantitative values.

File and folder management is possible through the left panel, where image data are distinguishable through thumbnails. With a simple double click, the image can be opened in the middle panel. Data can be organized separately by user and experiment. Most functions are represented by icons, making it easy for users to navigate without requiring special training. Each icon is designed intuitively, providing clear insight into its function.



Operation and analysis program for **Fluor *i* In Vivo**.

Specifications

Image Sensor	4/3" Color CMOS sensor
Resolution	1400 x 1050
Frame Rate	30 fps
Digital Output	24-bit
Interface Connector	USB 3.0
Ex light angle	45º
Distance of ex light	135 mm
Stage heating	yes
Chamber type	Standard
Channel	Blue (GFP, FITC…) Green (RFP, Cy3…) Red (Cy5.5, DiD…) NIR (Cy7, ICG…)
Channel number	1, 2, 3 or 4 (upgradable, maximum 4ch)
Capacity (Mouse)	3
Weight	12.5 Kg
Size (W x D x H)	260 x 260 x 400 mm

Lumi *i* In Vivo

Luminescence *In Vivo* Imaging System

High Quality Image sensor

Exceptional QE: 95% max

Cooling to -80ºC

Personal Imaging System (Compact, Easy, Cost effective)

Bio Luminescence *In Vivo* Imaging

Small animal and Plant

Tumorization, Cell tracking and Gene expression

Lumi i In Vivo is a device that can image and analyze Luminescence signals from tissues and organisms. Using an optimized camera for macro-imaging, Lumi i In Vivo can obtain intuitive and high quality images. NEOimage program providing with Lumi i In Vivo analyzes luminescence images easily. Lumi i In Vivo has a simple design, is easy to use, fast and reliable.

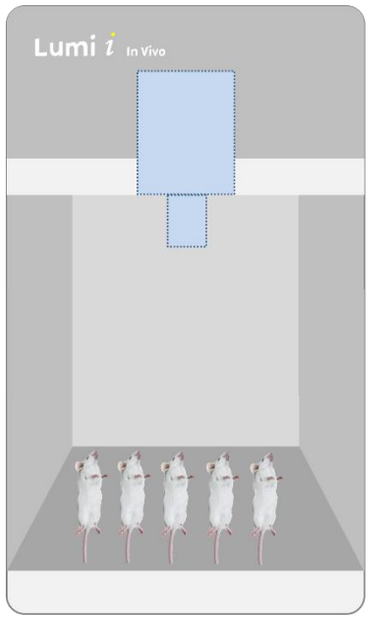
High Sensitive Camera Sensor

Lumi i In Vivo's uses the highly innovative 1 Megapixel, back-illuminated CCD cameras, offer single photon sensitivity across a large field of view, at 26 fps.
With a 1024 x 724 sensor format and 13 μm pixel size, the resolving power, field of view and unparalleled speed of the camera sensor render it the most attractive and versatile CCD option for In Vivo imaging applications.

Active pixels	1024 x 724
Pixel size (w x h; μm)	13 x 13
Image area (mm)	13.3 x 13.3
Cooling	-80ºC
QE max	95%
Read noise (e-)	< 1
Device Size (W x D x H)	300 x 300 x 510 mm

Simple

Lumi i In Vivo is structured as simple and optimal for quick and easy installation. It is also easy to move, manage, and maintain.
The Lumi i In Vivo has a compact size (30 x 30 x 51 cm), so it is ideal for small spaces. Due to its convenient size and portability, it can be used for a wide variety of applications.



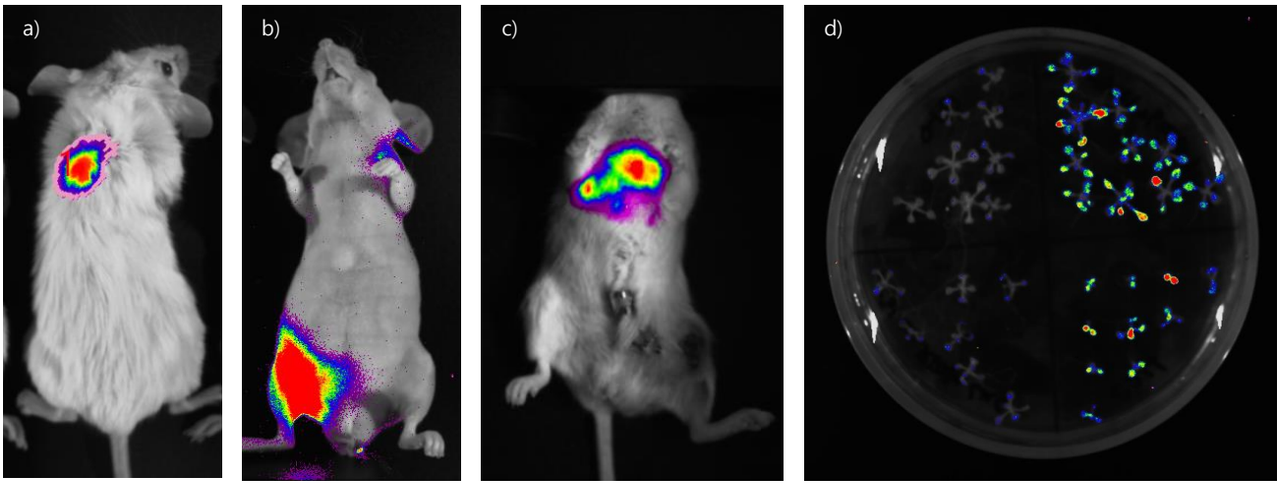
Simple structure faithful to functionality.

Quick Imaging

Determining an appropriate exposure time is sometimes difficult. The process of determining the exposure time, capturing the images, merging the bright image and signal image is just a click away.
You don't have to worry about it and just click it once, because the quantification is done after calibrating for various conditions.

Easy to Use

Hardware and software are user-friendly. Camera and LED light are controlled by imaging program. All of fuctions - live window, adjust exposure time and gain, capture, quatitation and merging image are simple and intuitive.



a), b), c) Tumorization experiments. d) Gene expression in Arabidopsis.

Fluor *i* Gel

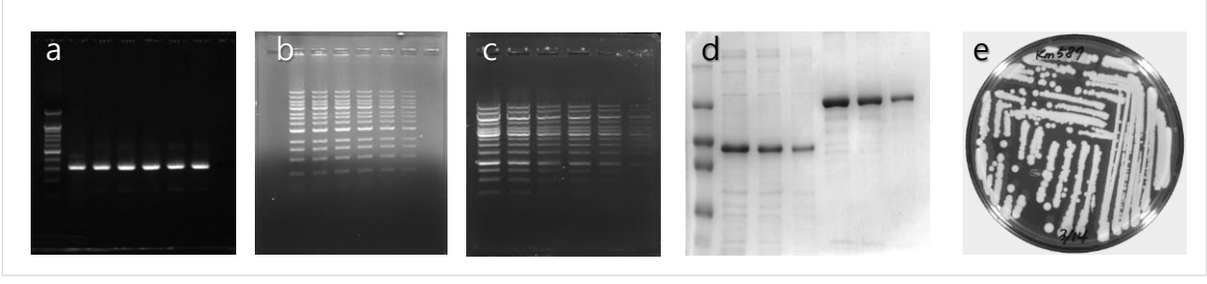
DNA gel Imaging System

DNA gel

LED light

Fluorescent detection

Fluor i Gel is a device that images DNA electrophoresis gel and analyzes. Fluor i Gel Blue is optimized for the reagents, wavelength of 450nm~490nm, that is invented alternative to EtBr. It consists of LED light and dark room chamber. Fluor i Gel can also be used in conjunction with UV transilluminator. Compact size and simple design has satisfied user's convenience. Gel can be observed through the window at the top and gel cutting can be done conveniently through the doors at each side. Our simple program enables users to obtain results easily and simply quantify the DNA band.



a. Plasmid DNA stained with loading type EtBr alternative reagent. b. DNA marker electrophoresed on agarose gel containing a gel mixture type of EtBr replacement reagent. c. DNA marker electrophoresed on agarose gel containing EtBr. Images obtained using a UV transilluminator and Fluor i Gel in combination. d. PAGE gel image. White plate, white light used. e. Petri dish image. White plate, white light used.

Specifications

Camera	1/2" 1.3M 8bit CMOS, 1280 x 1024 pixels
Size (W x D x H)	260 x 260 x 400 mm
Interface connector	Standard USB 2.0
Field of View	160 x 130 mm
Light source	Blue LED
Software	Image capture, Set ROI: Manual or Automatic
Analysis	Subtract background, measuring of intensity

NEOgreen / NEOred

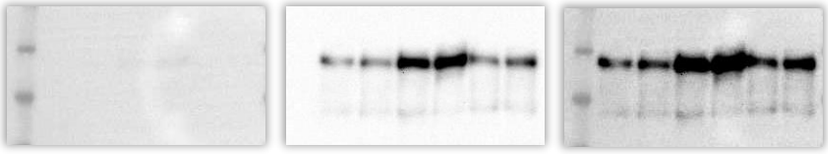
DNA staining reagent

(EtBr alternative reagent)

NEOgreen and NEOred are developed with the purpose of replacing EtBr. Same as the existing method, to make 100ml of Gel, 5~10ul of NEOgreen is needed. Therefore, the experimental method doesn't need to be changed. Blue light (470nm) and UV transilluminator can be used with it to observe the DNA gel

Lumi *i* Western

Chemi-luminescence Imaging System



Marker Signal Merge

Lumi i Western is optimized for Western blot experiment, using the highly efficient Cooling CCD Camera. Its compact size (260 x 260 x 400mm) helps make better use of a space in the laboratory. Its exposure time can be set by the users manually. And the images can be accumulated which enable users to choose the best image. Users can select a certain Region Of Interest (ROI), measure the ROI and manage the data using Microsoft Excel.

Easy to Use

Imaging program for Lumi i Western has an intuitive interface so that first-time users can easily learn how to use it. You can take pictures in three ways. Capture, Accumulate and Auto-accumulate. The Accumulate method acquiring images of the set exposure time and sequentially accumulating the images. Auto-accumulate acquires image accumulated by the time determined by Imaging program according to the sample situation. This function is useful when the intensity of the signal is unknown.
Lumi i Western's compact size and simple structure make it easy to use and manage.

High-sensitive Camera

Lumi i Western uses highly sensitive sensor with a quantum efficiency of up to 77%. Noise can be minimized by 40 ℃s cooling the sensor.

Quantitation

You can quantify the signal based on area and intensity. Quantitative data can be shown in tables and can be export to csv file.

Specification

Resolution	6.1 Mega pixel
Camera cooling	Ambient - 40°C
Working temperature	0 ~ 60°C
Size (WxDxH)	260 x 260 x 400mm
Interface connector	Standard USB 2.0
Field of View	220 x 180mm
Exposure type	Manual or Accumulate
Maximum exposure time	30 min
Data backup	Save the backup data at the same time
Measurements	ROI area, intensity and integrated density
ROI setting	Manually or automatically

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NeoScience Co., Ltd.

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