

LIGHTVISION

Near-Infrared Fluorescence Imaging System



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Near-Infrared Fluorescence Imaging System

ICG Fluorescence using Near-infrared light

The near-infrared fluorescence imaging system irradiates near-infrared excitation light on an ICG (indocyanine green) contrast medium injected into the blood vessels, lymphatic vessel, or other areas. It is a system that allows the observation of blood flow and lymph flow under the tissue surface by imaging the near-infrared fluorescence. This method, called ICG fluorescence imaging, enables the simple and real time identification of lymphatic vessel and the confirmation of blood flow during surgery. It has been confirmed to be useful for the quick localization of sentinel lymph nodes and, tissue and organ perfusion.



Optical Image



LIGHTVISION Image

Near-infrared light excites the ICG molecules, causing them to emit near-infrared fluorescent light.

The LIGHTVISION system displays an image of that near-infrared fluorescent light emission. Therefore, by administering ICG in blood vessels or lymphatic vessel, LIGHTVISION can visualize the blood flow or lymph flow, which is invisible to the naked eyes.



Irradiation with near-infrared light (780 to 800 nm wavelengths)

Excitation light

Creating an image of near-infrared fluorescent light (800 to 850 nm wavelengths)

Fluorescent light

ICG

Blood vessels, lymphatic vessel, etc.

Near-infrared and white light

Imaging in Bright Rooms

Room lighting does not need to be turned off when imaging during surgery, ensuring that surgery can be performed effectively.

*Surgical lights must be switched OFF.

Hands-Free Imaging

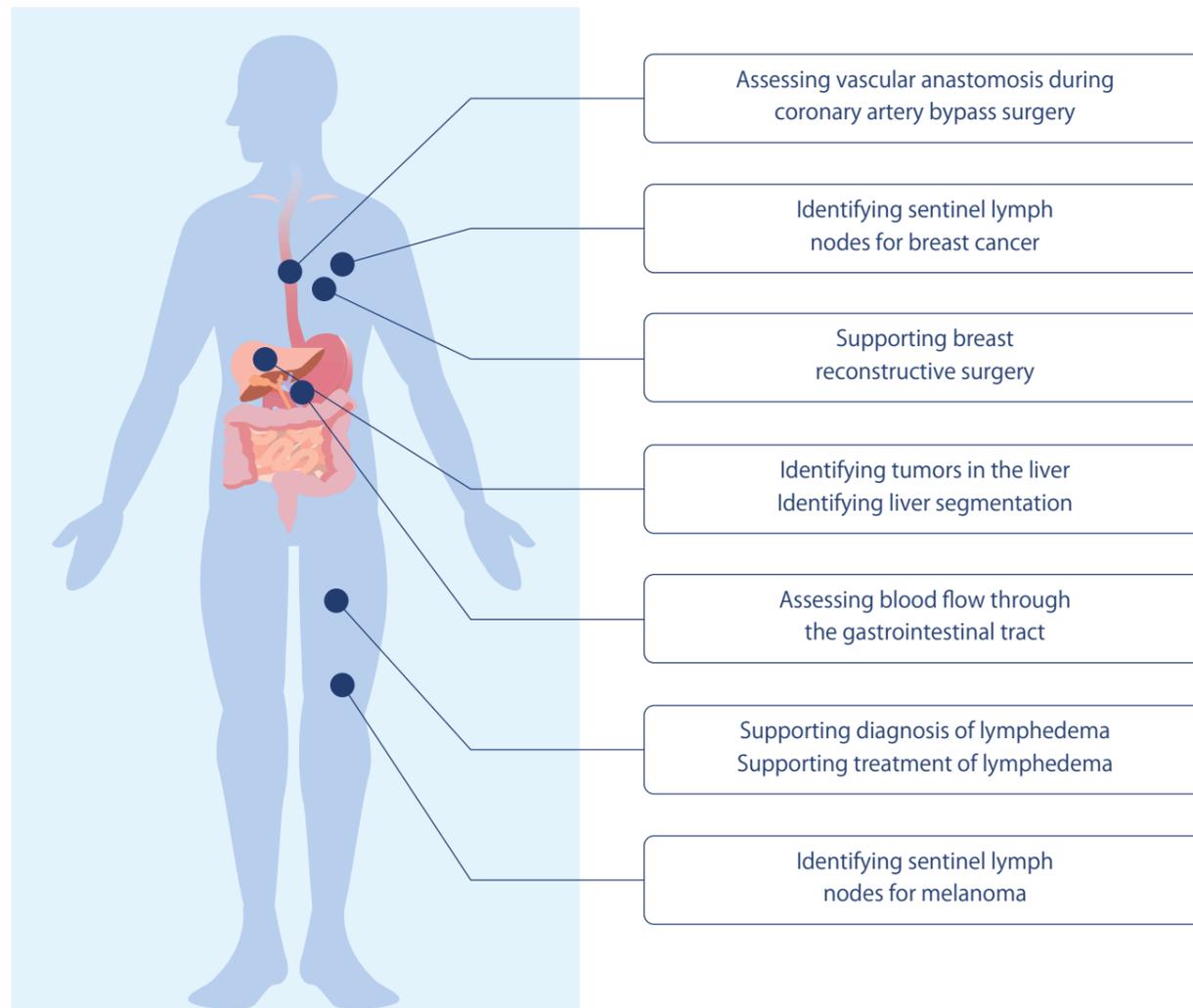
The camera is held by a self-supported extendable arm, which enables hands-free operation.

Sentinel Lymph Node Mapping

Perfusion Assessment of Organs and Flap

Patency Assessment of Bypass graft and Revascularization

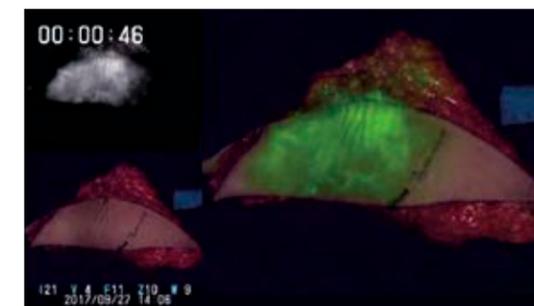
Shimadzu's LIGHTVISION system provides unprecedented clinical value by easily visualizing lymph and blood flow during surgery. Equipped with high definition sensors, the LIGHTVISION system displays detailed high definition images, which are especially useful for procedures requiring confirmation of blood flow through small blood vessels, such as in surgical flaps. Due to the large field of view, an image of a broad area, such as the abdomen, can be displayed on one screen, providing a quick overview when assessing blood flow through blood vessels in an abdominal flap or the gastric tube. Furthermore, the colors displayed in fluorescence images can be changed, which is especially helpful for identifying sentinel lymph nodes. Consequently, clinical applications of LIGHTVISION are expanding into a wide variety of surgical procedures.



Plastic and Reconstructive Surgery

Application Assessing blood flow through a surgical flap

The 10x zoom function provides a wide viewing angle, capturing a large field of view, including an entire large abdominal flap displayed on one screen, which is helpful for judging flap perfusion. An enlarged view can be used for high definition visualization of blood vessels to assess patency after anastomosis.



Breast Reconstruction
Assessment of Flap Perfusion

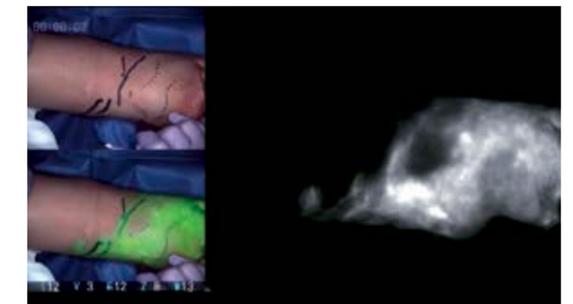


Breast Reconstruction
Assessment of Blood Vessel Patency

Application

Diagnosis and treatment of lymphedema

LIGHTVISION can support the determination of the progression of lymphedema by visualizing the pattern of travel through lymphatic vessels. During lymphovenous anastomosis(LVA) procedures, both near-infrared and visible images can be referenced to easily mark the lymphatic vessels.



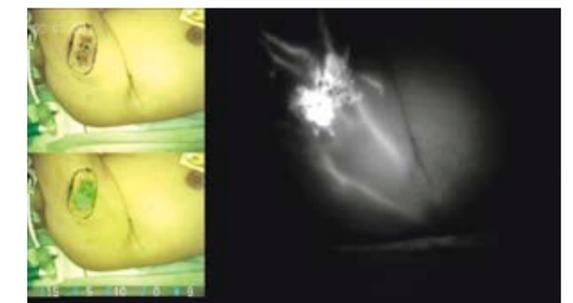
Marking Lymphatic Vessels
During LVA

Dermatologic Surgery

Application

Identifying sentinel lymph nodes for melanoma

Because LIGHTVISION is able to clearly display a large area on a single monitor screen, it can be used to quickly and easily trace the flow of lymph extending far from the primary cancer lesion.



Melanoma
Sentinel Lymph Node Biopsy

Breast Surgery

Application Identifying sentinel lymph nodes

LIGHTVISION helps identify sentinel lymph nodes accurately by clearly visualizing lymph flow over a broad area, extending from the primary lesion to the axilla. After incision, the zoom function can be used to display a magnified view of the incised area, so that lymphatic vessel can be visually identified during excision. Since it does not use any radioactive substance, no radiation exposure is involved.



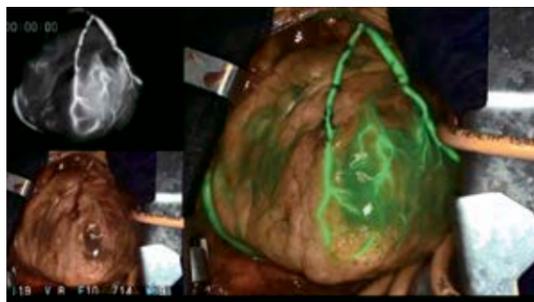
Breast Cancer Sentinel lymph Node Biopsy
Image provided by: Kochi Medical School Hospital Breast Center, Japan

Cardiovascular Surgery

Application

Assessing the patency of CABG

LIGHTVISION can be used for intraoperative assessment of the coronary artery bypass graft patency and the perfusion of blood through the myocardium during surgery.



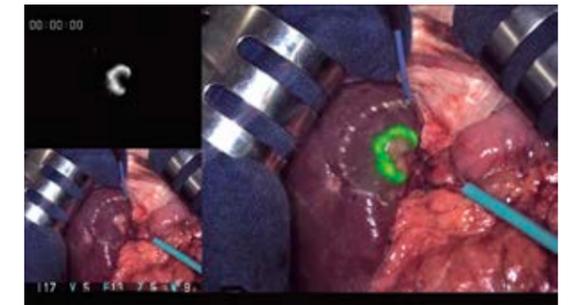
Coronary Artery Bypass Grafting (CABG)
Assessing Blood Vessel Patency and Myocardial Perfusion
Image provided by: Kochi Medical School Hospital, Japan

Hepato-Pancreato-Biliary Surgery

Application

Identifying tumors in the liver

Indocyanine green (ICG), used to examine liver function before surgery, remains unmetabolized in tumors and other areas with abnormal liver cells. This characteristic can be used to support more reliable and minimally invasive surgery by identifying tumors, determining the margins for excision.



Liver Tumor
Excising a Tumorous Area from a Liver

Application

Identifying the liver segmentation

By administering the ICG via a branch of portal vein, the affected region of the liver can be clearly visualized and the demarcation line for excision can be decided accurately.



Liver Tumor
Hepatic Segmental Resection

Upper Gastrointestinal Surgery

Application

Assessing blood flow through the gastric tube

Blood perfusion through tissue can be visualized with clear image quality. By visualizing vascularity during surgery with clear image quality, it visually supports deciding areas for anastomosis.



Esophagus Cancer, Assessing Perfusion of Gastric Tube Tissue
Image provided by: Kochi Medical School Department of Surgery | Japan

Accurate Surgical Navigation with High Definition Images

LIGHTVISION

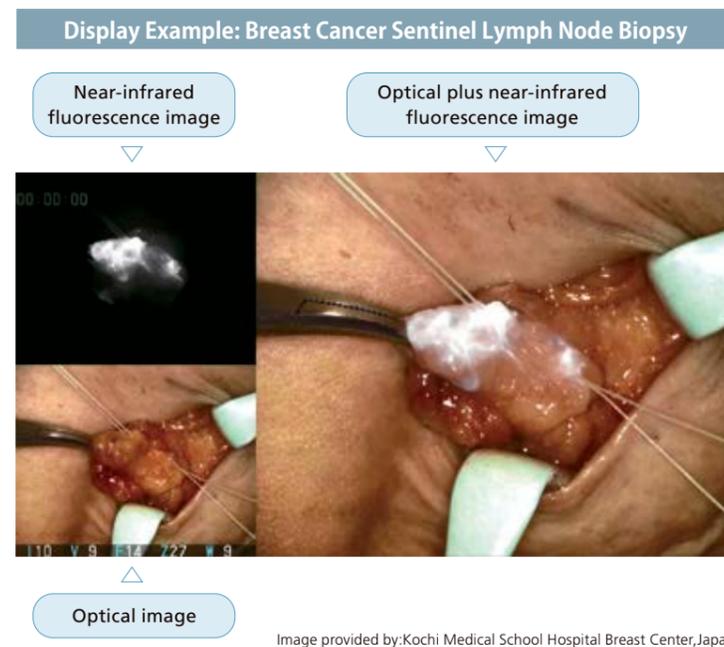
High Definition Image Quality

Equipped with high definition sensors, the system can display detailed high definition images. In addition to clearly confirming blood vessels and lymphatic vessel emitting fluorescent light, the high-resolution images can also be used to confirm the positional relationship between surrounding tissue and surgical tools during surgery. Given the accuracy and speed demands of the surgical environment, this system assists in making more accurate decisions more rapidly.

Display Images Clearly on a Large Monitor

It is possible to display the images on a large remotely located monitor to allow information sharing with all the surgical staff.

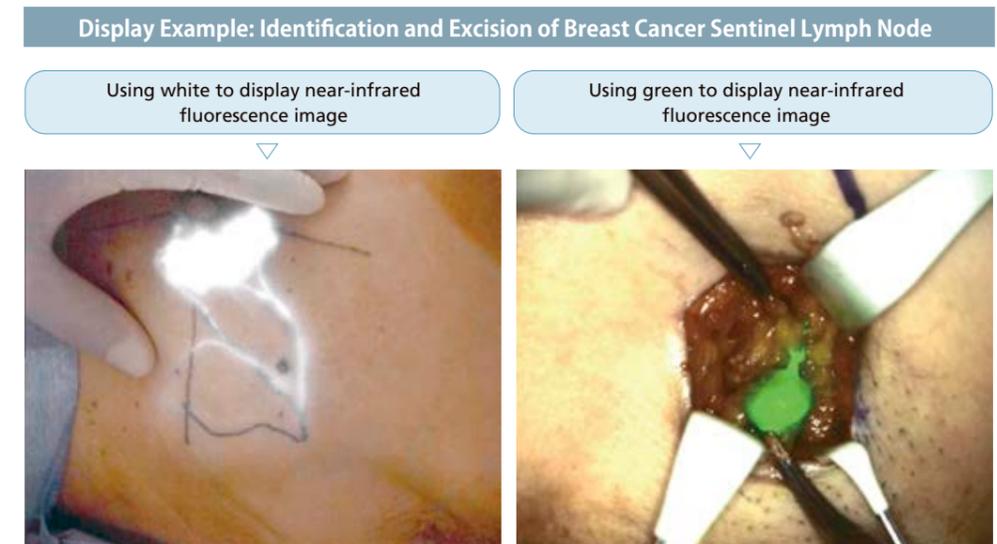
*The LIGHTVISION system does not include a monitor. Either use an existing monitor or contact your Shimadzu representative.



Colors can be Changed to Improve the Visibility of Blood Vessel or Lymphatic Vessel

To improve the visualization of blood vessels or lymphatic vessel, the color for the near-infrared fluorescence image can be changed to a white, green or blue color that is easier to distinguish from the surrounding tissues or light reflection of blood vessels or body fluids.

An easy to use button is used to change the color, so that the optimum color can be selected according to the condition of the surgical site.



Imaging is Possible in a Bright Room

Images can be acquired with the operating room lighting left ON, which means images can be compared to the affected area.

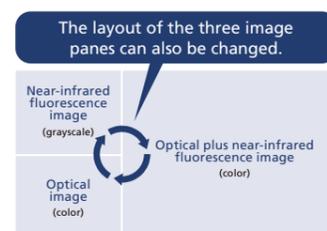
*Surgical lights must be switched OFF.



Simultaneous Three-Image Display Provides Clear Understanding at a Glance

The system can display three images, a optical image, a near-infrared fluorescence image, and a combined optical plus near-infrared fluorescence image, at the same time. This view enables confirmation of the area with ICG illumination by comparing it to the surrounding tissue, which is especially effective for determining the ablation range.

This enables a large amount of information to be referenced and confirmed at a glance during surgery, which can help shorten procedure times.



Excellent Operability Allows for Concentration on Surgery

LIGHTVISION

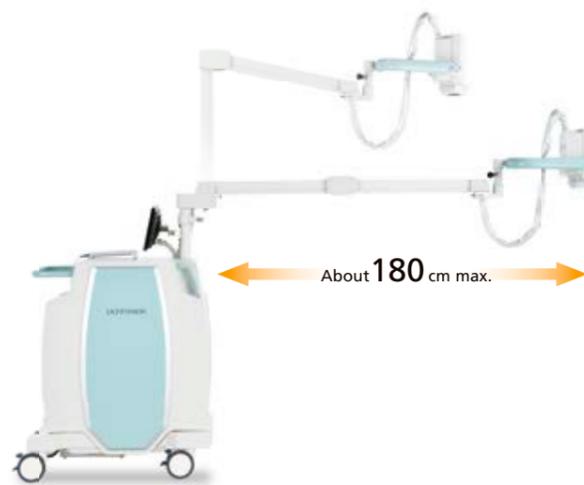
Hands-Free Imaging

The self-supported extendable arm allows hands-free operation. In addition to reducing the burden on surgical personnel, it can also display images without blur due to hand movement.



Wide Camera Movement Range

With the arm extendable up to about 180 cm, it is possible to locate the main unit away from clean areas and to create an optimal layout according to the situation of the operating room and peripheral equipment.



Ensures Working Distance Required for Surgical Work

Due to the bright light source and high sensitivity image sensor, a working distance (distance between the surgical field and camera) of about 50 to 70 cm can be maintained during imaging. Consequently, imaging can be performed at the same time as working in the surgical field.



Images can be Confirmed on a Small Monitor on the Main Unit

The operator can check the system operating situation and adjust image quality with a small monitor on the main unit.



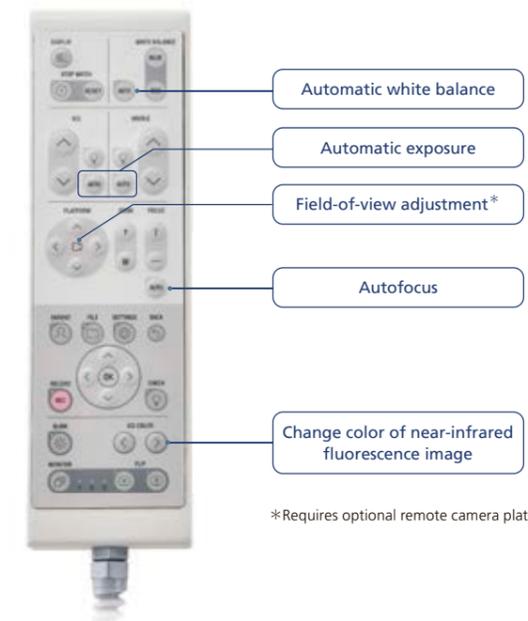
Freely Adjustable Camera Positioning

With a fully balanced arm, you can quickly position the camera height and angle as you wish. Images can be acquired via the optimal camera position depending on the type of surgery or condition of the affected area.



Camera Adjustments by Remote Control

Camera adjustment by remote control is possible. The remote control includes three automatic adjustment functions : exposure, focus, and white balance, which quickly optimize the image display.



*Requires optional remote camera platform.

Main Unit is Easy to Move and Reposition

The main unit is designed so that it can be moved easily between operating rooms. Handles are provided on the front and back, so that the unit can be easily repositioned within the operating room.

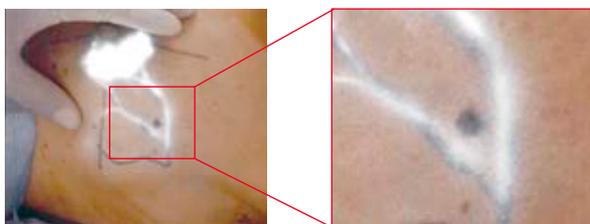


Option

Remote Adjustable Field-of-View Camera Platform^(optional)

An optional camera platform is available for adjusting the camera angle by remote control.

It can be operated from a location away from the main unit to adjust the camera field of view, so that the area of interest is displayed.



Angle is adjustable about 15 degrees, forward, backward, left, or right.



In combination with the zoom function, ICG can be tracked by remote control.

Specifications

Images Displayed	Optical image, near-infrared fluorescence image, Optical plus near-infrared fluorescence image
Lighting	White LED Near-infrared LED for excitation Near-infrared LED for confirmation
Near-infrared Fluorescence Image Display Colors	Green, blue, and white
Camera Adjustment Functions	Zoom Manual Focus Automatic / Manual Exposure Automatic / Manual White balance Automatic / Manual
External Output	Digital image outputs (DVI-D) × 2 Analog composite image output (BNC) × 1
Power Supply	100/110/120/200/220/230/240 V AC, 50/60 Hz, 500 VA
External Dimensions (W×H×D)	611×1960×850mm (stowed dimensions, excluding protrusions)
Weight	225kg

Configuration

Main unit
Remote controller

Options

Remote camera platform
Additional remote controller

※The LIGHTVISION system does not include a monitor or drapes. If they are desired, contact your Shimadzu representative.

Founded in 1875, Shimadzu Corporation, a leader in the development of advanced technologies, has a distinguished history of innovation built on the foundation of contributing to society through science and technology. We maintain a global network of sales, service, technical support and applications centers on six continents, and have established long-term relationships with a host of highly trained distributors located in over 100 countries. For information about Shimadzu, and to contact your local office, please visit our Web site at www.shimadzu.com



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Shimadzu Corporation Medical Systems Division has been certified by TÜV Rheinland as a manufacturer of medical systems in compliance with ISO9001:2008 Quality Management Systems and ISO13485:2003 Medical Devices Quality Management Systems.

Remarks:

- Indocyanine Green(ICG) is necessary to use this product. Indication for use of ICG may vary within the countries. Please Kindly refer the package insert.
- Every value in this catalogue is a standard value, and it may vary a little from the actual at each site.
- The appearances and specifications are subject to change for reasons of improvement without notice.
- Certain configurations may not be available pending regulatory clearance. Contact your Shimadzu representative for information on specific configurations.
- Before operating this system, you should first thoroughly review the Instruction Manual.