RaySafe™

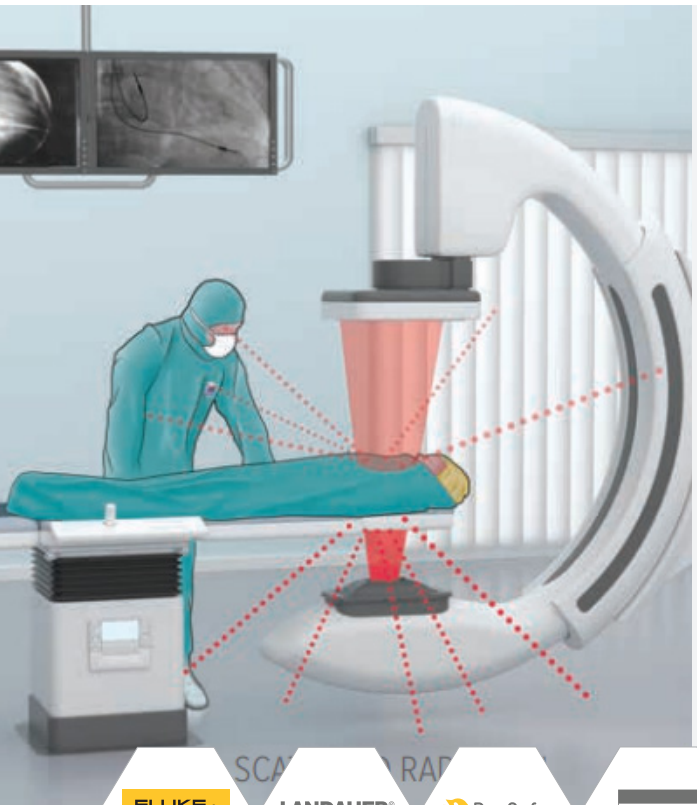
RaySafe i3 Real-time Dosimetry.

Giving you control.

FLUKE Biomedical · LANDAUER · RaySafe™ · VICTOREEN

See and reduce your radiation exposure.

Interventional cardiologists and staff have the highest radiation exposure of any medical profession. Radiation exposure can be reduced significantly by optimizing behavior and by using protective devices.
Use the RaySafe i3 to build a better radiation safety culture. It visualizes X-ray exposure in real time using easy-to-read bar graphs. Instant feedback empowers medical staff to learn and adapt their behavior to minimize unnecessary radiation exposure. Measurements are simultaneously stored for post-procedure analysis, to facilitate continued learning as well as to enable comparison over time or between labs.



Did you know?

- Radiation exposure from medical procedures has increased seven times in the United States between 1980-2006[1]
- With increasing doses of radiation, the risk of cancer increases linearly[2]
- Interventional cardiologists (IC) and their staff have the highest radiation exposure of any medical profession[3]
- Career exposure[4] (average 20-year IC career)

Exposure	Head	Lower body
Dose	1,000 mSv	100 mSv
Equivalent to	50,000 Chest X-Rays[5]	5,000 Chest X-Rays[5]
1,000 mSv correlated to a 5 % risk of cancer[6]		

1. National Council on Radiation Protection and Measurements, Report No. 160 “Ionizing Radiation Exposure of the Population of the United States”.
2. International Commission on Radiological Protection. The 2007 Recommendations of the International Commission on Radiological Protection. ICRP publication 103. Ann ICRP (2007) 37:1-332.
3. Venneri, L et al. Cancer risk from professional exposure in staff working in cardiac catheterization laboratory: Insights from the National Research Council’s Biological Effects of Ionizing Radiation VII Report. American Heart Journal, (2009) 157: (1), 118-124
4. Picano, E. et al. Cancer and non-cancer brain and eye effects of chronic low-dose ionizing radiation exposure. BMC Cancer, (2012) 2: (1), 157
5. International Atomic Energy Agency, Radiation Protection for Patients (RPOP) “X-rays: What Patients Need to Know” https://www.iaea.org/resources/rpop.
6. National Council on Radiation Protection and Measurements Limitation of Exposure to Ionizing Radiation. Bethesda, MD: National Council on Radiation Protection and Measurements: No 116 (1993).

RaySafe i3
Real-time Dosimetry

Real-time View

Real-time View, shown on the lab's main screen or on a stand-alone display, shows dose data for connected dosimeters in real time. Green, yellow and red bars indicate the dose rate for each individual. In the on-screen display configuration, the average dose rates of the last seven pedal presses are shown as colored bars to the right.

Real-time Dosimeter

The Real-time Dosimeter measures and records radiation every second. Data is transferred wirelessly to the Real-time Hub.

A USB connector connects the Real-time Dosimeter to the Dose Viewer software, which can be used to change settings and to view and export dose data. The dosimeter is easy to wear, requires minimal maintenance and is made to be personalized.

Software

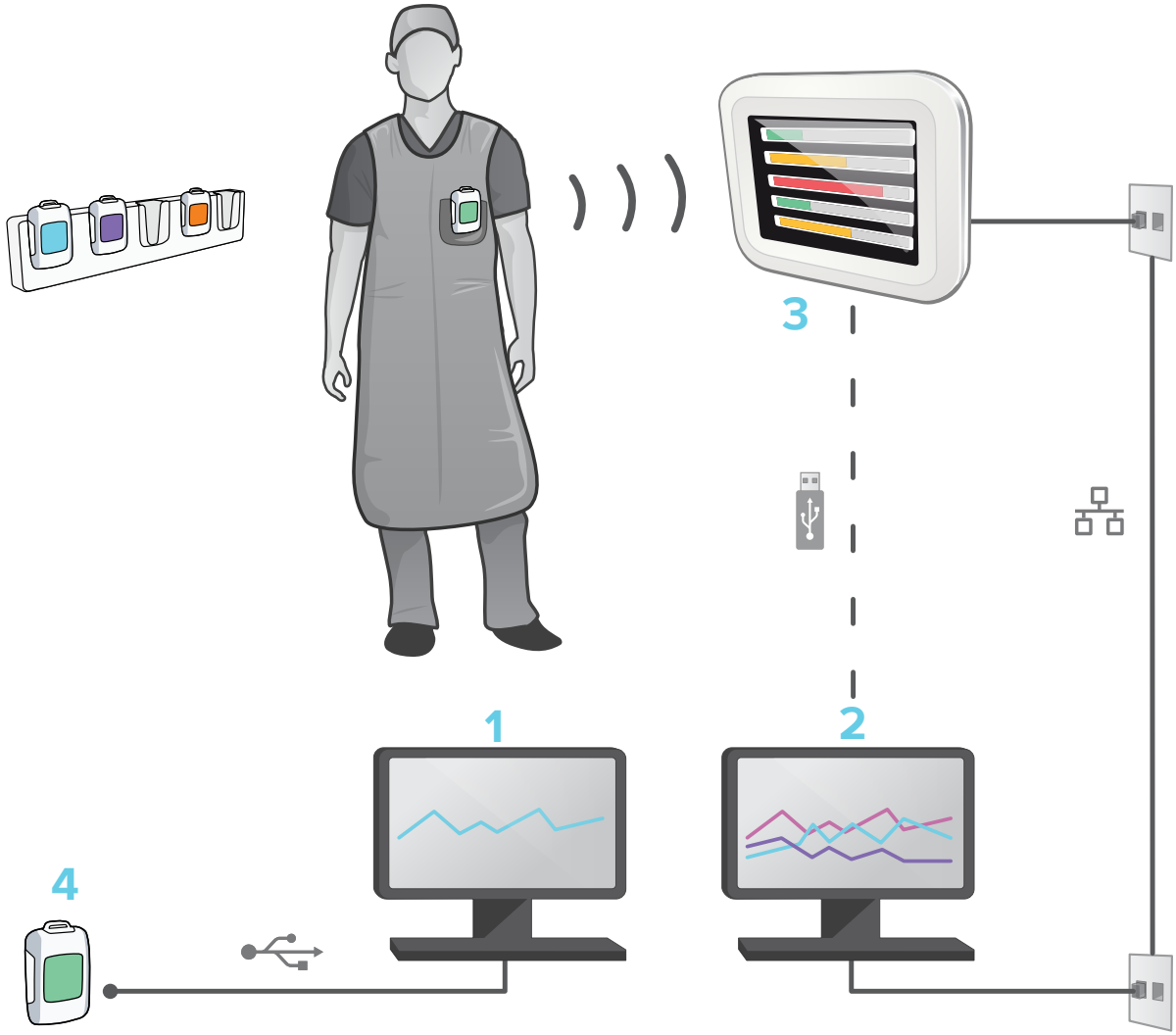
Dose Viewer is used for administrating dosimeters and viewing personal dose information. For advanced analysis, reporting and archiving of dose information, use Dose Manager. It manages multiple dosimeters and can retrieve dose information from multiple i3 systems throughout the hospital network or via USB storage.

> **"The improvement in radiation protection has been more than dramatic at the URMC. There is no substitute for a constant and real-time reminder of the dose being received."**

Labib H. Syed, M.D., M.P.H.
University of Rochester Medical Center

RaySafe i3 system configurations

RaySafe i3 with stand-alone display



1. Dose Viewer

- Administration of individual dosimeters
- Shows dose history for the connected dosimeter
- Exports data for further analysis, e.g. in Excel

2. Dose Manager

- Collects dose history for all dosimeters
- Syncs with real-time display using the network or a USB memory
- Tools for analysis
- Exports data for further analysis, e.g. in Excel

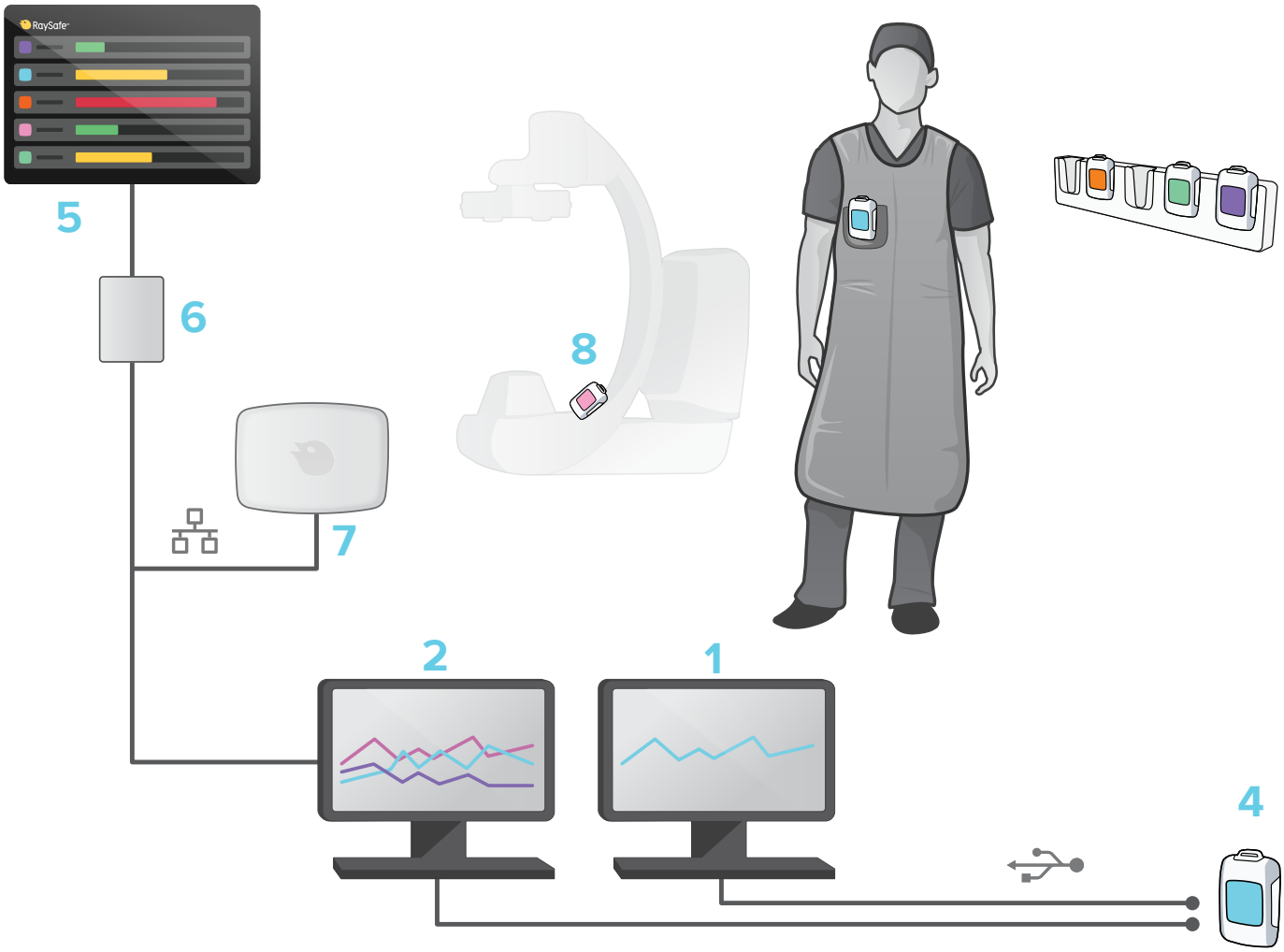
3. Real-time Display

- Shows dose rate in real time for up to 8 dosimeters
- Stores all dose data for all dosimeters within range

4. Real-time Dosimeters

- Measures dose and dose rate for every second
- Stores dose rates for the last hour of exposure (3,600 samples), stores dose per hours for 5 years.

RaySafe i3 with on-screen display



5. Real-time View

- Shows dose data for connected dosimeters immediately via green, yellow and red bars for each individual user

6. Video Unit

- Uses data provided by Real-time Hub to render the Real-time View, which is transmitted as a video signal (HDMI/DVI)

7. Real-time Hub

- Communicates with dosimeters within range
- Collects data and makes it available to the Video Unit, as well as to Dose Manager
- Can be accessed within the hospital network, via a web browser, to download stored dose data.

8. Reference dosimeter

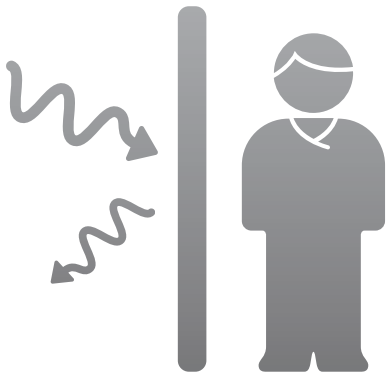
- Provides context for the dose data
- Enables the history bars on the Real-time View's right hand side

ABCs for a Radiation Safety Culture™

A

Avoidance

Protective clothing and devices, such as lead aprons, thyroid collars, glasses, ceiling suspended screens and table-mounted lead curtains, are the first line of defense against radiation exposure. Personal dosimeters are used to monitor and help regulate exposure.



B

Behavior

Your behavior will affect your radiation exposure. When feasible, increase the distance and decrease the exposure time. Furthermore, scatter radiation is typically lower on the detector side. Finally, ensure that the proper equipment and appropriate techniques are used, including collimating the X-ray beam.

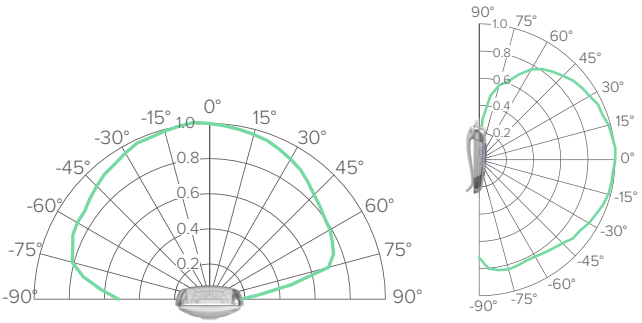
C

Control

Ultimately, controlling your dose is easiest when it is known. Only an active dosimeter, such as the RaySafe Real-time Dosimeter, provides constant, real-time radiation exposure information. With the information it provides, healthcare workers can take action to reduce their dose.

Technical specifications

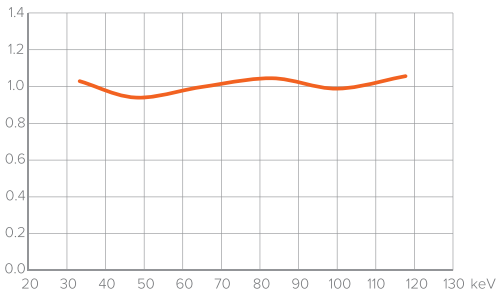
Typical angular response (relative to 0°)



Horizontal

Vertical

Typical energy response



Radio	
Frequency	866.0 MHz, 868.3 MHz, 918.3 MHz or 927.9 MHz, depending on purchased configuration (see label on product)
Transmitter power	Dosimeter output: 3.2 mW Hub output: 1 mW Real-time Display output: 1 mW
Communication range	Typically 5 – 15 m, depending on the local environment

Video Unit	
Dose unit	Sv or rem
Dimensions	112 × 84× 34 mm (4.4 × 3.3 × 1.3 in)
Weight	355 g (12.5 oz)
Power	External supply
Video output	HDMI 1.4b
Network	1000BASE-T

Software requirements	
Operating system	Dose Viewer: 32-or 64-bit Windows 7, 8.1, 10 or 11 Dose Manager: 64-bit Windows 7, 8.1, 10 or 11
System memory	At least 2 GB
Storage	At least 15 GB available space (Dose Manager)

Real-time Hub	
Weight	180 g (6.3 oz)
Dimensions	184 × 134 × 35 mm (7.2 × 5.3 × 1.4 in)
Power	Power over Ethernet
Network	100BASE-TX

Dosimeter	
Weight	34 g (1.20 oz)
Dimensions	40 x 58 x 17 mm (1.6 x 2.3 x 0.7 in)
Operational quantity	$H_p(10)$
Energy dependence	< 25 % (N-series, 40 – 150 kV)
Temperature dependence	< 5 % (18 °C – 26 °C) < 25 % (15 °C – 18 °C, 26 °C – 35 °C)
Response time	< 1 s, above 100 µSv/h < 5 s, below 100 µSv/h
Integration interval	1 s
Detection limit	< 30µSv/h
Dose rate uncertainty (continuous radiation)	10 % or 10µSv/h (40 µSv/h – 150 mSv/h) 20 % (150 mSv/h – 300 mSv/h) 40 % (300 mSv/h – 500 mSv/h) The measured dose rate is monotonically increasing up to 1 Sv/h.
Dose reproducibility	10 % or 1 µSv
Maximum lifetime dose	10 Sv
Battery	CR2450 (replaceable, 1 – 2 years lifetime depending on usage)
Communication	Radio communication to real-time display, carrier frequency depending on region. USB port for connection to PC

Real-time Display	
Dose unit	Sv or rem
Dimensions	300 × 250 × 60 mm 11.8 × 9.8 × 2.4 in
Weight	1 240 g (43.74 oz)
Display	10.4" touch screen
Storage	Dose rate by second and accumulated dose by hour for connected dosimeters. For 50 dosimeters the memory size allows storage of up to 5 years of accumulated dose and dose rate for the last 250 hours of exposure each.
Interfaces	Ethernet connection for Dose Manager USB connection for synchronizing data to USB memory stick
Power	12 V DC, <1.5 A External power supply included

Instrument specifications are subject to purchased configuration.
All specifications may change without notice.
Product is not available in every country.
Check with your local representative for further information.

“We feel better about our work and our safety. Now that we see what RaySafe real-time dosimetry does for us, we wouldn’t want to work at a place that doesn’t have it.”

Dawn Dowling, Technologist
Lawrence General Hospital

Like a canary in a coal mine

In the early days of coal mining, canaries were used as warning systems. If the little yellow bird stopped singing, the miners knew that the level of dangerous gases had substantially increased and it was time to exit the mine.

In the operating room, RaySafe i3 is the modern-day canary. By providing real-time, accurate and easy-to-interpret dose information, RaySafe i3 helps healthcare workers decide when it is time to adjust their working behavior to avoid unnecessary exposure.

RaySafe 452 Survey Meter
As versatile as you are.

One device for every situation means less to carry, learn and administrate. That equals less expense, more efficiency and time savings.

Learn more today: RaySafe.com

RaySafe
We empower our everyday heroes to focus only on protecting lives

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