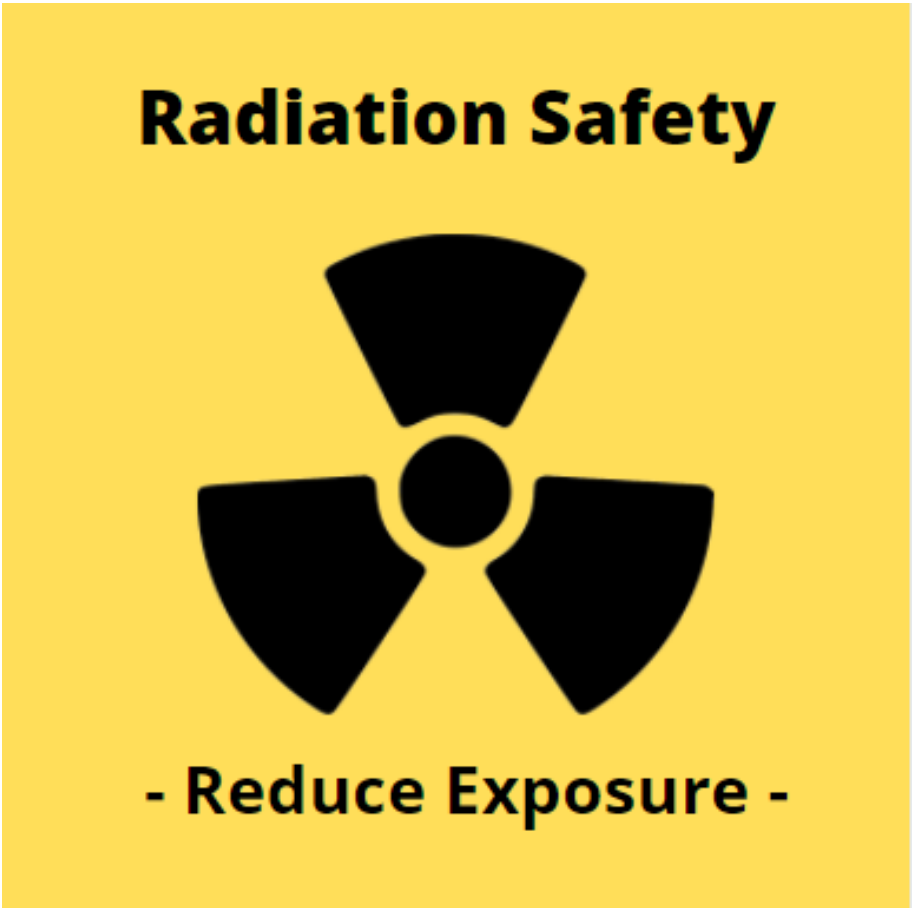
AI and ROI Technology Reduces Radiation – How It Works

June 22, 2021



OMEGA
Medical Imaging

The use of ionizing radiation during interventional procedures has become an indispensable tool in the diagnosis and treatment of several medical conditions. With the increased use of radiation has come an increased risk to the physician, the staff, and the patient. There are different techniques and best practices that can help reduce radiation exposure. There are also technologies that dramatically reduce radiation dose – beyond what is possible with even the best ALARA efforts of time, distance, and shielding.

One such advanced technology is secondary collimation. Primary collimation is the narrowing of the x-ray beam to part of the anatomy. The restriction of the beam, often manually controlled, reduces the surface area of the patient that is subjected to radiation and, thus, reduces the risk of scatter radiation to the physician and staff. Collimation has long been strongly recommended to reduce radiation dose while still producing high-quality images. But what about secondary collimation?

Artificial intelligence (AI) can take collimation to the next level. AI is a far-reaching term that, quite frankly, is overused and often tossed around without real meaning. In our last article, we explained that not all AI is the same. AI has a great place in medical imaging for image analysis. But it can also do a lot more.

AI can establish and control the region of interest (the ROI) during an interventional procedure – allowing the physician to focus more on their work and on their patient. By monitoring the size of the ROI, AI can automatically optimize a dynamic, high-speed secondary collimation that dramatically reduces the radiation exposure in the room. AI does this far faster than what is manageable by human operators and is adaptive to the changing ROIs of interventional procedures. AI and secondary collimation work together to increase the radiation safety to the physician, the staff, AND the patient.

But is all technology the same? Despite the claims of many manufacturers and despite the misperception of many in healthcare, the unfortunate answer is no. Not all technology is the same. Not all technology provides the same radiation protection.

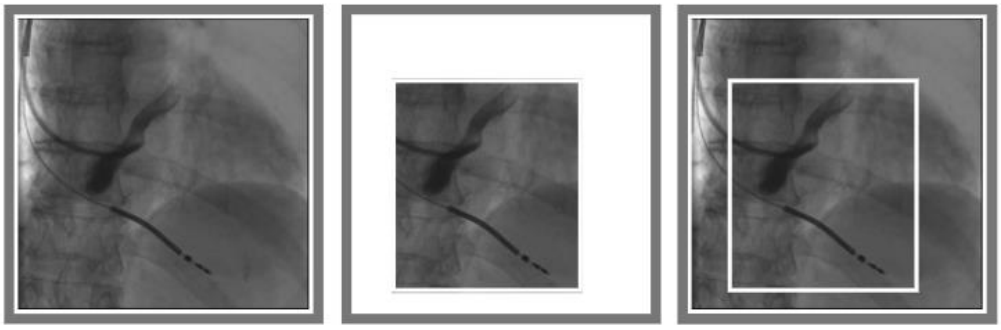
Interventional cases are often done using a full field of view (FOV) that disregards the physician's actual ROI. This exposes the patient to unnecessary radiation and the physician and staff to additional scatter radiation.

AI-enabled technology can detect where in the anatomy the interventionalist is focused and automatically collimate to that ROI with the secondary collimator. The area outside the ROI, the FOV, is then refreshed every set number of frames using the primary collimator – saving radiation exposure to the patient and to everyone in the room. Advanced image processing simultaneously and seamlessly integrates the ROI and FOV images into one continuous image.

But how does it work?

During an interventional case, Omega's unique AI-enabled technology immediately and automatically detects the ROI of the interventionalist. This true AI system follows the movement of devices (endoscopes, catheters, etc.) to maintain and adjust the ROI. The process is automatic and hands-free – reducing distractions and input requirements from the physician or staff without disrupting workflow.

The system leverages an ultra-fast secondary collimator that automatically optimizes the shutter location, size, and geometry – the ROI – up to 30 frames a second. The dynamic secondary collimator blocks radiation to the peripheral (FOV) anatomy outside of the ROI – exposing it to a dramatically reduced rate of radiation pulses. Advanced control systems and image processing opens the primary collimator at a set rate to take a full FOV image that is then integrated with the dynamic ROI image. The FOV image provides, in essence, a road map of the peripheral anatomy for the physician while the ROI image provides the exceptional image quality the interventionalist needs.



Full Field of View (FOV) | **Region of Interest (ROI)** | **AI image-guided technology blends the FOV and ROI into one seamless image**

The Omega system blends the proven benefits of ROI technology with the power of AI to dynamically collimate to the ROI with ultra-fast speed to optimize the radiation reduction to the patient and staff – far exceeding what traditional systems can achieve, or even promise.

The advantages are obvious – the patient is subjected to dramatically reduced radiation exposure which, in turn, reduces the scatter radiation to physicians and staff while delivering superior image quality.

Omega represents a new standard of care as it is the only FDA-cleared AI image-guided interventional system proven to reduce radiation exposure by up to 84%. This reduction is in addition to any current ALARA best practices for radiation exposure and far better than any conventional non-AI system. Omega's AI-enabled system goes beyond merely managing radiation to provide actual reduction in dose. The result is a groundbreaking solution that provides safer healthcare for both patients and staff.

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