

OptiMAX IGRT

Imaging Module for Optical Molecular And X-Ray Image Guided Radiation Therapy Research

Precision X-ray Inc., is pleased to announce the launch of the **OptiMAX IGRT Imaging Modules for Optical Molecular and X-Ray Image Guided Radiation Therapy** research. The OptiMAX-IGRT Modules are a family of multimodal (optical and X-ray) Imaging modules that have been incorporated into the X-RAD high energy X-ray Radiotherapy product line for biological research.

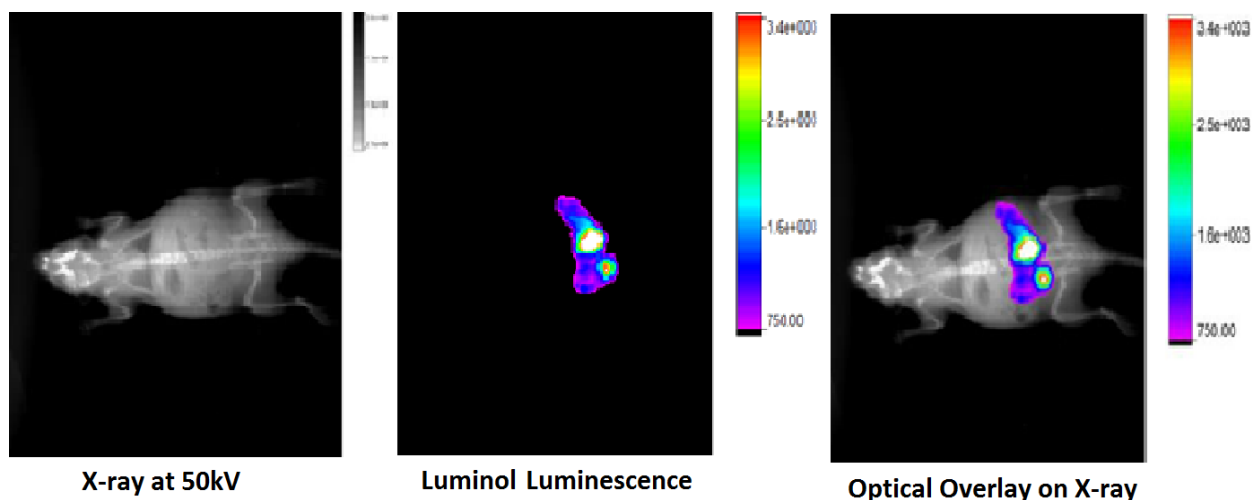
OptiMAX IGRT Imaging System: The OptiMAX-IGRT Imaging System for Optical Molecular and X-Ray Image Guided Radiotherapy research has been designed for insertion into the market leading X-RAD biological irradiation system. This provides researchers with the only high energy X-ray irradiation system that will perform both optical and X-ray imaging of their cells, tissues or animals for pre-treatment image guided localization of target tissues and for post treatment diagnostics of results at a molecular and functional level. This highly cooled CCD based system allows the researcher to image their animals in X-ray mode and optical mode and then to overlay the images in a precise fashion to allow excellent co -registration of luminescent tumors or target tissues on an X-ray background of the animal. The new imaging system can also be used to provide precise localization and documentation of high energy collimated dose fields. All of this can be accomplished without ever moving the animal between imaging modalities or radiation treatment protocols.



OptiMAX IGRT

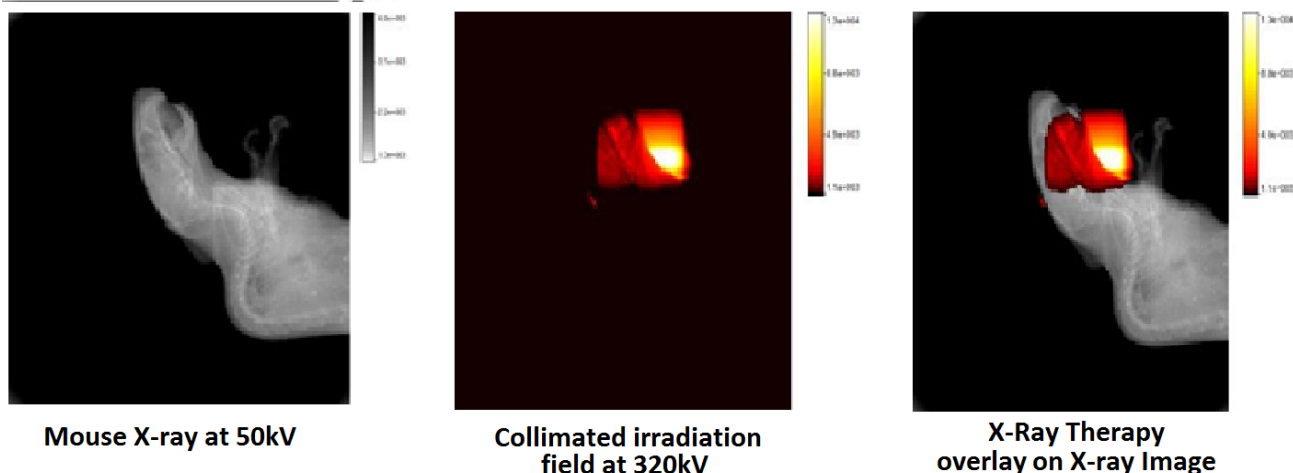
High Sensitivity Luminescence and X-ray Imaging

The OptiMAX IGRT can be used to capture high sensitivity, high resolution optical molecular images of light coming from animals both pre and post irradiation. These luminescent images can easily be overlaid onto X-ray images to provide precise localization of the luminescent signals. In the example below the mouse has received an i.p. injection of luminol which has been shown to give off significant levels of light after high energy whole body irradiation of the animal due to increased ROS activity. The luminescent image can then be overlaid on a low kV X-ray image and analyzed for intensity changes.



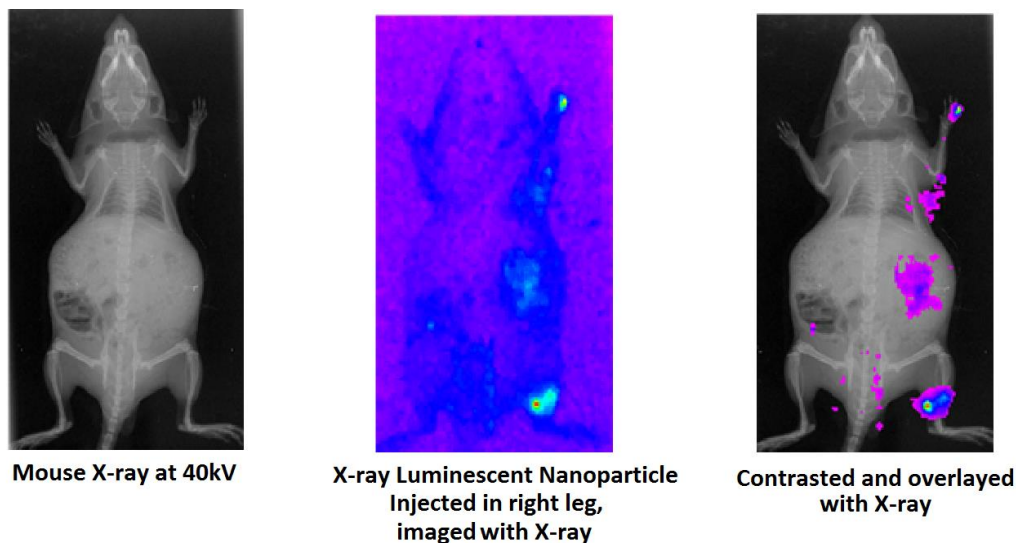
High Energy X-Ray Dose Localization

The OptiMAX IGRT allows precise localization and documentation of a delivered dose field on tissues or animal samples. The X-ray images of mice or of multiple mice can be captured first by capturing an image of the entire X-ray field at a low kV. A collimated field can be chosen either with a fixed collimator or with an X-RAD Adjustable Collimator. When the collimated high kV X-ray dose is delivered, an image of the collimated irradiation field can be captured. The collimated field can then be overlaid on the initial X-ray image for precise localization of delivered dose on the sample.



High Sensitivity Imaging of X-Ray Luminescence Nanoparticles

The **OptiMAX IGRT** can also be used to capture high sensitivity, high resolution optical molecular images of light coming from animals during irradiation when x-ray luminescent materials are injected into the animal. Many new X-ray luminescent materials such as nanoparticles are being used for identifying targeted sites in tissues and in animals during x-ray treatment. These X-Ray luminescent images can easily be overlaid onto typical X-ray images of the samples to provide precise localization of the x-ray luminescent signals on the x-ray background of the animals. In the example below the mouse has received an injection in one hind leg of an X-Ray luminescent nanoparticle which has been shown to give off significant levels of light during whole body irradiation of the animal. The X-ray luminescent image can then be overlaid on a low kV X-ray image and analyzed for location and intensity changes.



High Sensitivity Luminescence Imaging

Instrumentation: Precision X-Ray X-RAD 320 OptiMAX Molecular Imaging Guided Radiation Therapy (MIGRT)

[illegible]

X-ray Image \rightarrow Overlay Image \leftarrow Luminescence Image

Imaging System for Optical Molecular and X-Ray Image Guided Radiation Therapy Research

Shielded Cabinet inserts inside the X-RAD Biological Irradiator
Protects camera and electronics from high energy X-ray irradiation
Provides sliding chamber for moving imaging system into and out of X-Rad

•CCD Chip	2048x2048 (4 Megapixel) B&W, Interline
•Lens	Fixed, fast f /0.95 (Optional: 10x Zoom, f2.8 Lens)
•Image Resolution	Fixed, fast lens: 67 um/pixel , (Option 10x zoom ~um/pixel)
•Data Acquisition	16-bit single capture, n-bit data acquisition
•Binning	1x2, 2x2, 1x4, 2x4, 4x4, 1x8, 2x8, 4x8, 8x8, 16x16
•Dark Current	<= 5x10 ⁻⁵ e/Pixel/Sec
•Read Noise	<7 e rms (Nominal)
•Dynamic Range	>4 OD
•Quantum Efficiency	@ 470nm > 55%
•Automated Focus and Aperture	

5 Animal chambers



4 position emission filter wheel

Computer and Software

Image Capture and Analysis Software Suite
Windows based PC Workstation

Installation and Training

The system will be fully installed into the X-RAD system in your facility.
Training on the operation and use of the imaging system and software will be supplied.
X-RAD chamber modifications to limit amount of ambient light in the chamber will be implemented.

OPTIONS

Emission Filters

Emission filter wavelengths at 440nm, 530nm, 600nm, 670nm, 700nm, 720nm, 790nm and 830nm

Anesthesia Unit

Mobile Anesthesia unit w/ Well-fill Isoflurane vaporizer is designed for safe, simple, and controllable
inhalation anesthesia for rats, small rodents, exotics, and patients weighing under 5 pounds (2.27 Kg). Some of the key features are listed below.

- 0 to 4 lpm flow meter with expanded 0 to 1 scale
- Non-rebreathing system with 1 liter bag
- 5 caster mobile base
- Oxygen flush valve with safety restrictor
- Non-rebreathing circuit
- Dual O2 supply ready with check valves

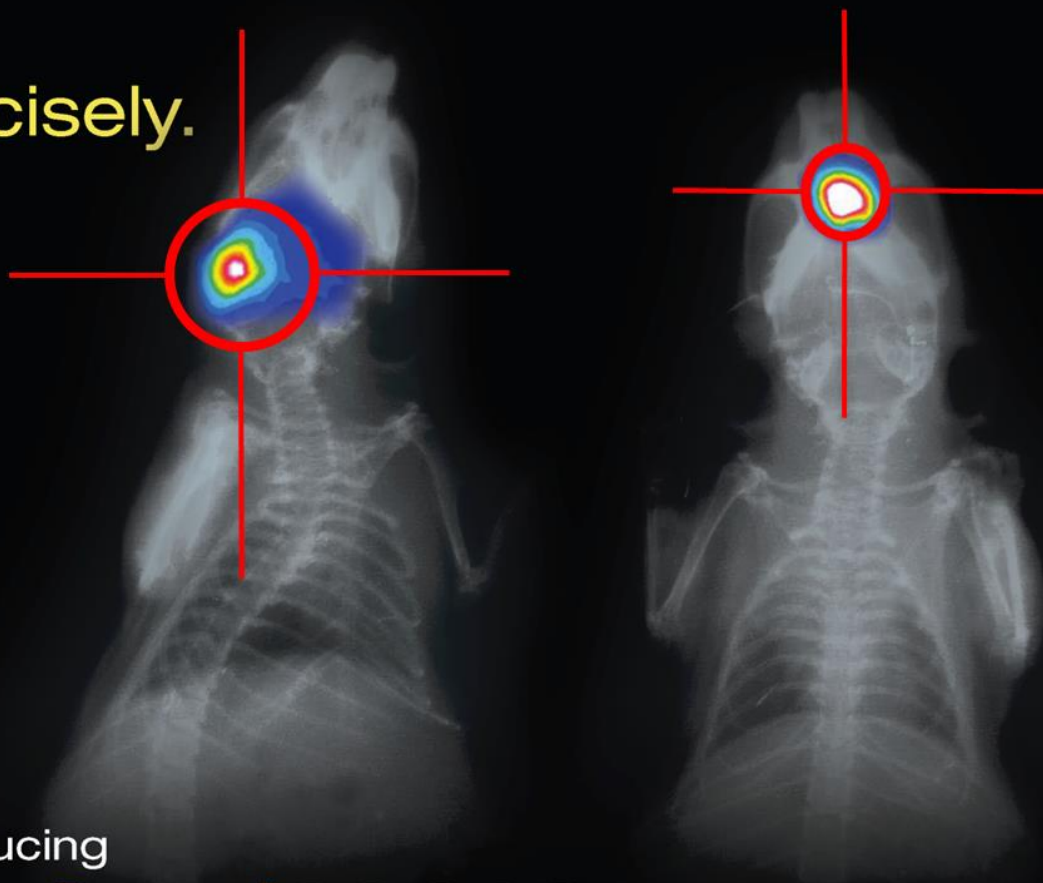
Nose Cone Manifold and Tubing

5 position nose cone manifold and tubing

To learn more about this exciting new imaging capability to add to your high energy X-ray irradiation system please contact Bill McLaughlin at wmclaughlin@pxinc.com or call at (203) 484-2011.

Shouldn't your X-ray irradiator incorporate multimodal molecular imaging for targeting tumors?

Precisely.



Introducing

 **OptiMAX**
MOLECULAR IMAGE GUIDED RADIOTHERAPY

- Target tumors with X-ray and luminescence imaging
- X-ray luminescent nanoparticle imaging
- X-ray dose field imaging
- X-Y stage for automated target centering

Learn more. Go to pxinc.com. Or call 203 484-2011.