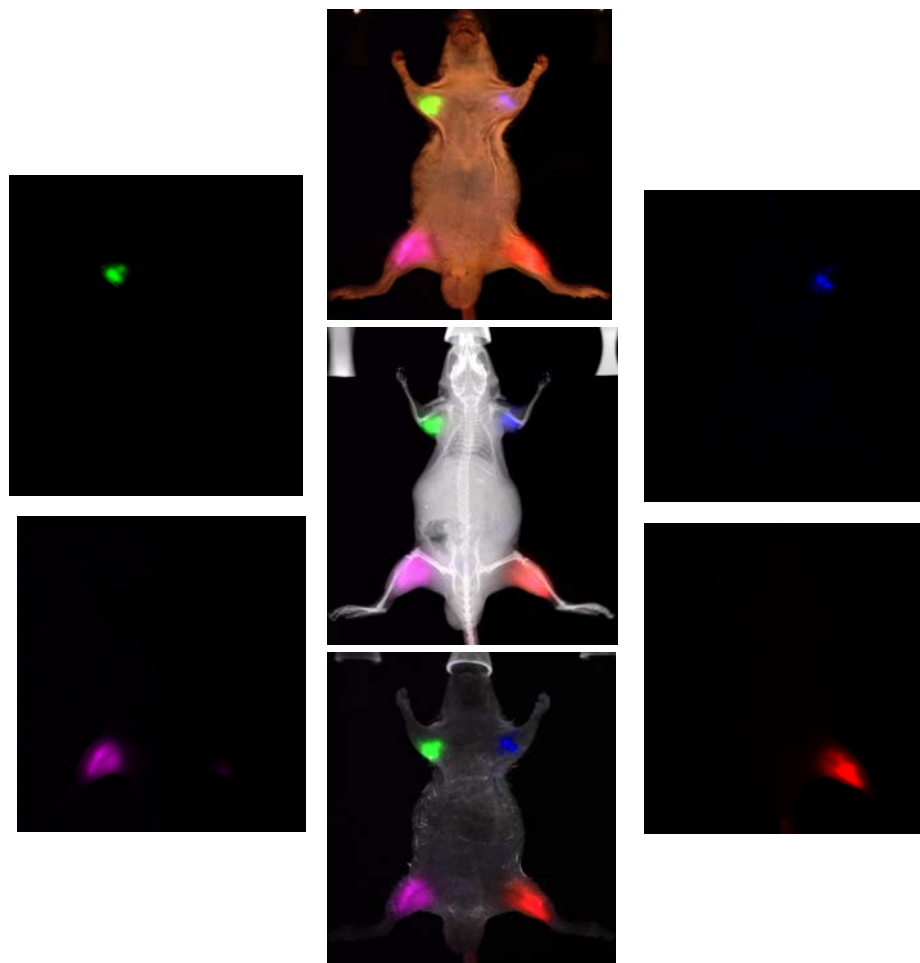


## KODAK In-Vivo Multispectral System FX

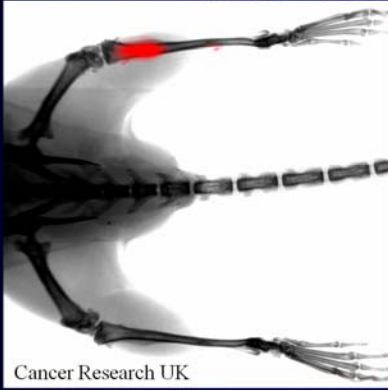
Combines advanced multispectral fluorescence, luminescence, digital x-ray and radioisotopic imaging for in-vivo imaging in a single system.

The system's new multispectral tuning of excitation light provides enhanced sensitivity allowing for the identification and separation of multiple fluorochromes and the removal of autofluorescence background. The KODAK In-Vivo Multispectral Imaging System FX automatically generates multispectral fluorochrome image "cubes" with spatially co-registered x-ray and white light images for improved localization of biological markers in-



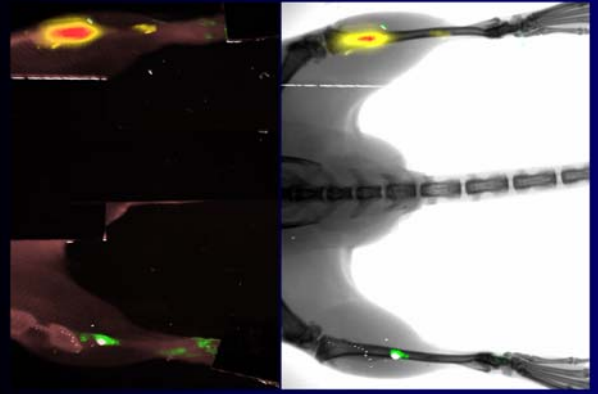
The KODAK In-Vivo Multispectral Imaging System FX is designed to enable researchers to precisely locate and monitor changes in molecular activity of specific areas of interest—long before morphological changes can be detected—expediting the development of effective therapeutics for disease treatment. The System enables life science researchers to pursue a research path for a particular disease or therapeutic from *in vitro* to *in vivo* applications—moving from specimen to “live” *in vivo* studies using advanced software capable of analyzing and comparing many different types of molecular applications. It is currently the only instrument available that provides multispectral fluorescence, luminescence, digital x-ray and radioisotopic imaging capabilities for *in vivo* (small animal) imaging.

### Near IR Labeled Stem Cells in Bone Marrow



Cancer Research UK

### DIR and Green Fluorescence in Mouse Bone Marrow



Courtesy Cancer Research UK

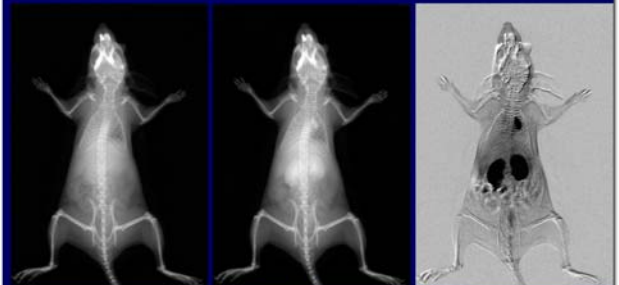
### High Resolution Bone Density Analysis



Create as many bone segment ROIs as needed, edit each, save work, then simply select the Bone Density button to initiate the few seconds of total analysis of all segments.

Bone Density

### X-Ray Contrast of Kidneys

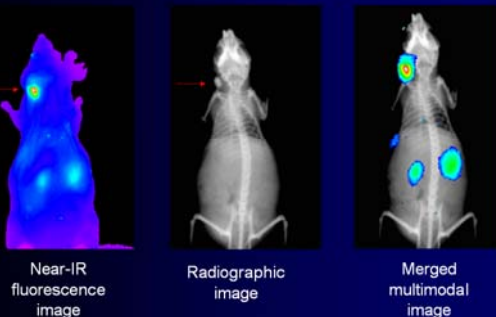


Pre-Image

Post Visipaque injection

Subtracted image

### Tumor Imaging Using Fluorescent Probes and X-Ray



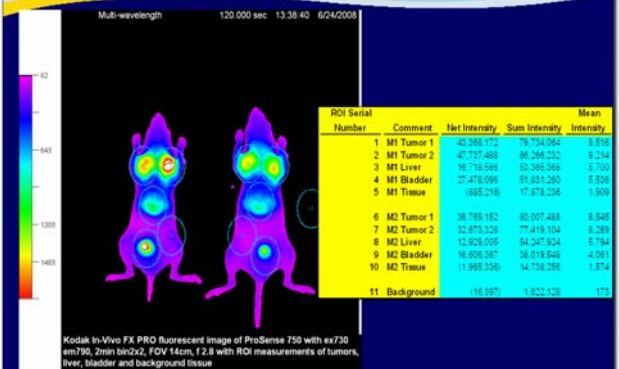
Near-IR fluorescence image

Radiographic image

Merged multimodal image

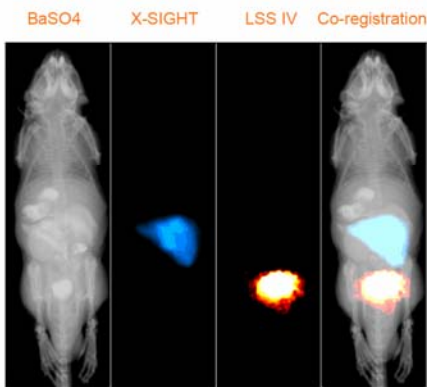
(S. Achilefu, Washington University School of Medicine)

### In-Vivo Tumor Imaging and Analysis



Courtesy DIMI Workshop 2008, Milano Italy

### MARS Images – Obvious Importance of Multiple Angles



BaSO4

X-SIGHT

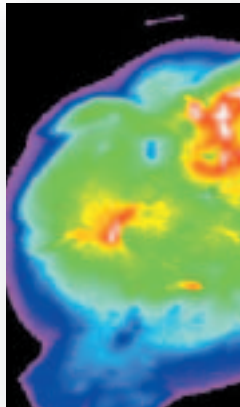
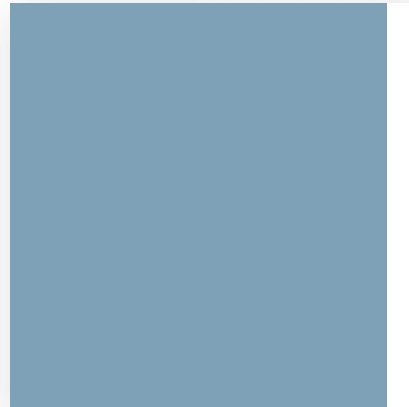
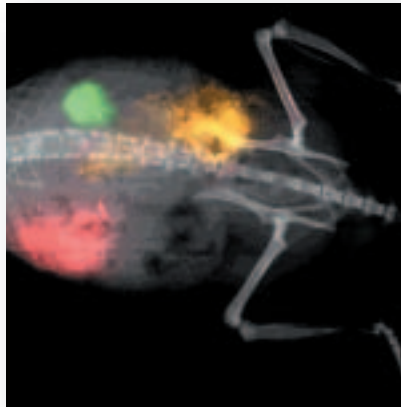
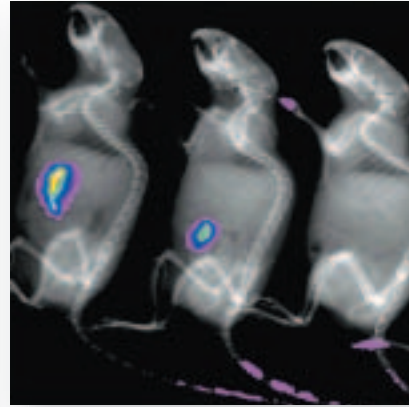
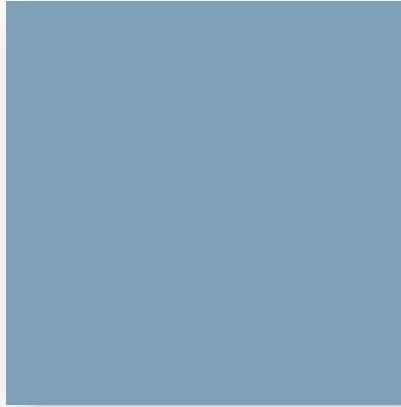
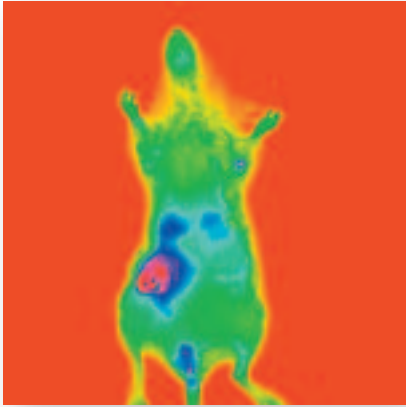
LSS IV

Co-registration

### Clear, Quantifiable, X-ray and Multispectral Optical In One Instrument



**Nå kan du gjøre et kjempekupp på vår demomodell som kun har vært brukt på utstillinger og seminarer. (Priser eks. MVA og 1% miljøgebyr.) Veil pris: Kr. 1.475.000,- Tilbudspris kun: Kr. 895.000,-**



**Kodak**

In-Vivo Imaging Systems

High-sensitivity  
optical molecular imaging *and*  
high-resolution digital X-ray

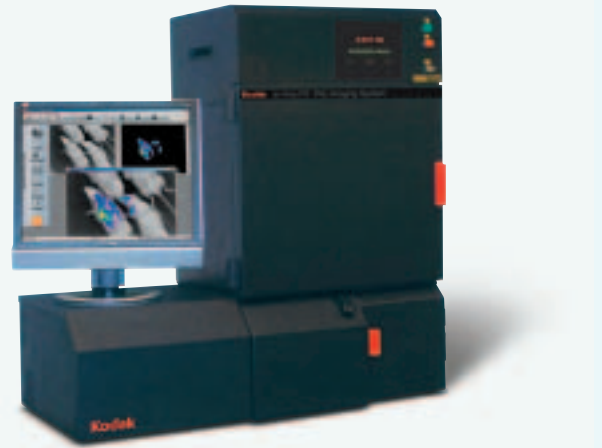
## In vivo imaging solutions available in several packages

Carestream Molecular Imaging offers a selection of KODAK In-Vivo Imaging Systems so you can choose one that best meets your particular imaging needs. Each combines high-sensitivity optical molecular imaging and high-resolution digital X-ray in a single multimodal system.



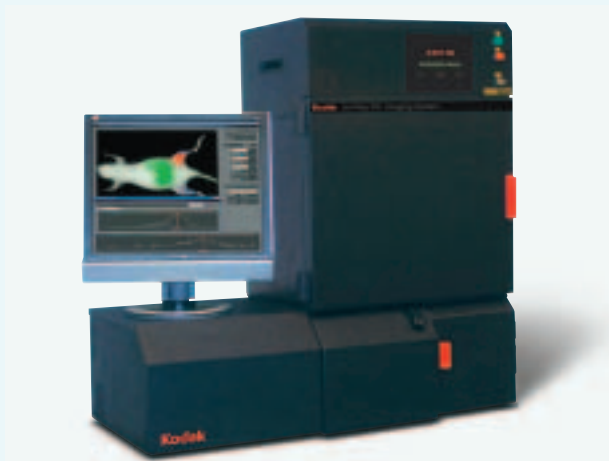
### ➔ **Kodak** In-Vivo Imaging Systems F and FX

KODAK In-Vivo Imaging Systems F and FX provide high performance optical molecular imaging of near-IR fluorescent, radioisotopic and luminescent labels in small animals. They feature cooled CCD technology, selectable multi-wavelength illumination, and the In-Vivo FX (pictured here) includes an X-ray module for sensitive, quantitative X-ray imaging enabling precise anatomical localization of biomarkers of interest.



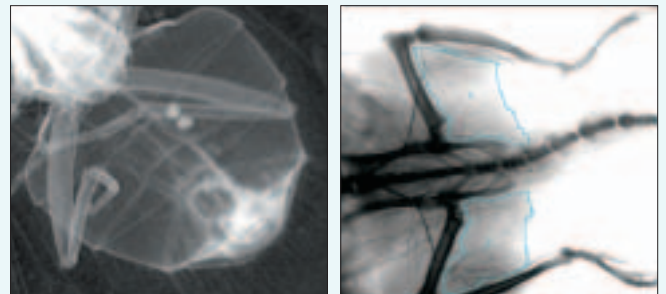
### ➔ **Kodak** In-Vivo Imaging Systems F and FX Pro

The NEW KODAK In-Vivo Imaging System FX Pro combines high-sensitivity optical molecular imaging and high-resolution digital X-ray (In-Vivo FX Pro only) to deliver precise anatomical localization of molecular and cellular biomarkers. New full precision automation simplifies complex multimodal imaging protocols and takes sensitivity, throughput, and ease of use to an entirely new level.



### ➔ **Kodak** In-Vivo Multispectral Imaging System FX

The KODAK In-Vivo Multispectral Imaging System FX combines multispectral imaging with high-resolution X-ray imaging. The fully automated system's powerful multispectral analysis software identifies and separates multiple fluorochromes which are spatially co-registered on the image. In addition, the system is capable of detecting luminescence and radioisotopic signals.



### ➔ **Kodak** Digital X-ray Specimen System 4000 and 4000 Pro

KODAK Digital X-ray Specimen (DXS) Systems are ideal for small animal X-rays, plants, and more. The cabinet-style systems feature energy ranging from 15-35 kVp and a radiographic phosphor screen, generating images with outstanding 25 line pair per millimeter resolution. The DXS 4000 Pro features automated controls and filters for enhanced workflow.





## In-Vivo Imaging Systems

### Sets the Standard for Multimodal Molecular Imaging

KODAK In-Vivo Imaging Systems combine high-sensitivity optical molecular imaging and high-resolution digital X-ray in a single multimodal system. Whether you're performing multi-wavelength fluorescent, radioisotopic, luminescent, X-ray, or a combination of all of these imaging modalities, there's a KODAK In-Vivo Imaging System to meet your needs.

#### Unmatched Imaging Versatility

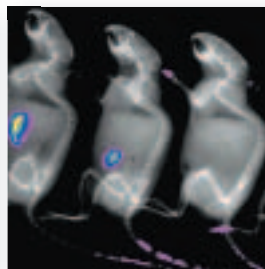
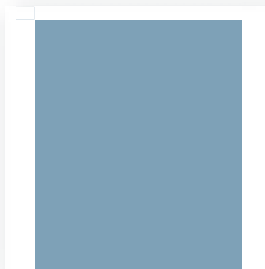
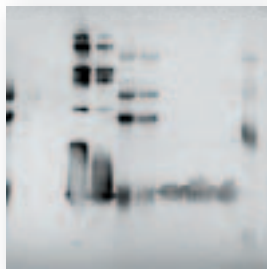
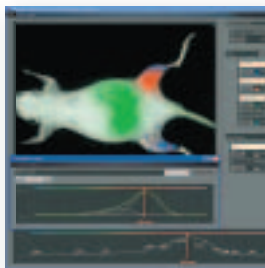
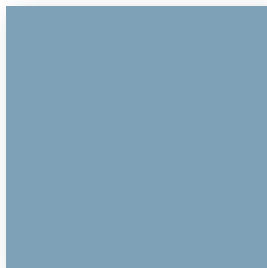
- ▶ Quantitative imaging of multi-wavelength fluorescent, luminescent, and radioisotopic labeled biomolecules in combination with X-ray imaging
- ▶ Selectable multi-wavelength excitation from 385 to 770 nm allows for quantitative imaging of a wide range of fluorochromes and label multiplexing
- ▶ Anatomical localization of molecular biomarkers with precise co-registration of optical molecular images with X-rays
- ▶ Longer excitation wavelengths green to near-IR improve the penetration of light into tissue, enabling whole body, optical *in vivo* molecular imaging
- ▶ Accommodates *in vitro* assay formats including blots, plates, and gels

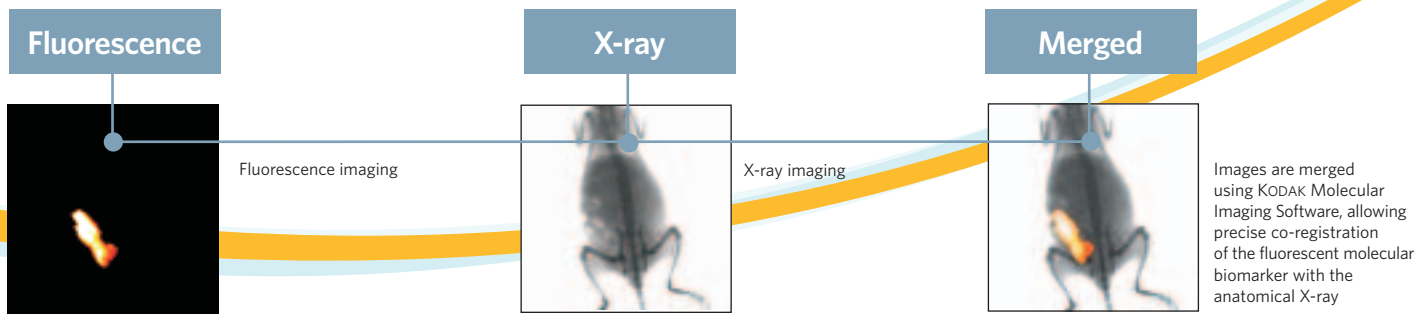
#### Superior Image Quality

- ▶ Advanced camera electronics and cooled CCD technology allow long exposure times and image integration, ideal for luminescent and radioisotopic labels
- ▶ Up to 16-pixel symmetrical and asymmetrical X- and/or Y- binning options allow for up to a 256-fold increase in detection sensitivity
- ▶ Closed optical path image (COPI) chamber design maximizes sensitivity and resolution by minimizing the distance from the subject to the lens
- ▶ Visualize and accurately quantify bright and faint signals across >4.0 orders of magnitude in a single image
- ▶ Patented wide angle emission filters eliminate image artifacts to enhance detection sensitivity and image quality

#### Fast, Convenient Workflow

- ▶ Excitation light is optimized to ensure high-quality images and time-saving throughput
- ▶ Live preview and parfocal optical design facilitate easy subject positioning and focusing
- ▶ Standard, time-lapse, and progressive exposure options execute multiple imaging protocols
- ▶ Save your preferred exposure routines for one-click access





### High performance

- ▶ Enables accurate quantitation of biomolecules of interest in basic research, drug discovery, drug development, and therapeutic monitoring applications utilizing small animals
- ▶ Improves understanding of imaging agent's biodistribution through combined use of time-lapse molecular imaging and digital X-ray imaging
- ▶ Safe in-lab operation—the In-Vivo FX System complies with federal safety regulations for cabinet X-ray imaging systems

### Complete System

- ▶ Includes animal management center, ports, and thermal controls to facilitate imaging of small animals
- ▶ KODAK Molecular Imaging Software provides accurate quantitative analysis, comparative intensity, geometry and positional data. The software also provides annotation capabilities and powerful database tools.

### KODAK In-Vivo Imaging System F

The KODAK In-Vivo Imaging System F provides all the features of the KODAK In-Vivo FX System with the exception of X-ray imaging capabilities.

### Automated Control: the Pro Series

- ▶ KODAK In-Vivo Systems are available in the Pro configuration, providing fully automated controls that enable reproducibility of protocols and increase workflow efficiencies
- ▶ Automated computer-controlled configuration minimizes set-up time, maximizing efficiency and throughput of measurements
- ▶ The highly accurate automated lens system records the precise *f*-stop, zoom, and focal plane every time, helping to ensure reproducibility and traceability

- ▶ Smart digital positioning technology operates 15 excitation (In-Vivo FX Pro only) and four emission filters to deliver precision alignment
- ▶ Automated aluminum filters enable control of X-ray wavelengths for optimal X-ray imaging of soft tissue or bone

### KODAK In-Vivo Multispectral Imaging System FX

The system's new computer controlled multispectral tuning of excitation light provides enhanced sensitivity allowing for the identification and separation of multiple fluorochromes and the removal of autofluorescence background. The KODAK In-Vivo Multispectral System automatically generates multispectral fluorochrome image "cubes" with spatially co-registered X-ray and white light images for improved localization of biological markers *in vivo*. A wide range of excitation wavelengths, from optical through near-infrared, enable optimum imaging of a wide range of fluorochromes and biomarkers.

- ▶ Sophisticated software algorithms remove autofluorescence for improved signal-to-noise and detection
- ▶ Powerful software identifies fluorochromes through excitation-based signature by modeling of data and providing unmixing of the fluorochromes
- ▶ New image capture control software allows complex imaging protocols to be easily established, stored and repeated
- ▶ Automated excitation and emission filter systems with 29 excitation filter positions and four patented wide angle emission filter positions deliver outstanding fluorescent imaging sensitivity and flexibility

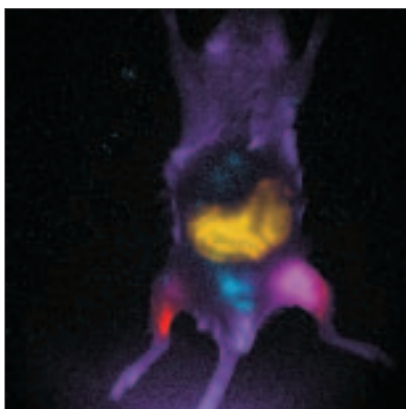


# Specifications

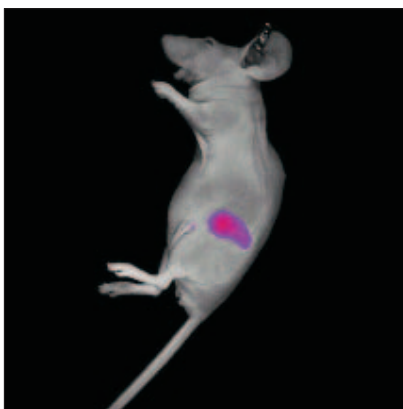
In-Vivo F   In-Vivo F Pro   In-Vivo FX   In-Vivo FX Pro   In-Vivo Multispectral   DXS 4000   DXS 4000 Pro

|                                   |  | In-Vivo F                                     | In-Vivo F Pro                      | In-Vivo FX                        | In-Vivo FX Pro                     | In-Vivo Multispectral              | DXS 4000  | DXS 4000 Pro        |
|-----------------------------------|--|---|------------------------------------|-----------------------------------|------------------------------------|------------------------------------|-----------|---------------------|
| <b>Camera</b>                     |  |   |                                    |                                   |                                    |                                    |           |                     |
| CCD                               | Monochrome interlined CCD  | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Pixel Density                     | 2048 x 2048 pixels   | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Cooling                           | -29°C absolute, thermoelectrically cooled  | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Lens                              | 10x zoom, 20-200 mm, f2.8  | Manual  | Automated                          | Manual                            | Automated                          | Automated                          | Manual    | Automated           |
| <b>Illumination</b>               |  |   |                                    |                                   |                                    |                                    |           |                     |
| Source                            | 150W Halogen (standard), 175W Xenon (optional)<br>Xenon  | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Fluorescence                      | Selectable multi-wavelength, epi-illumination, Halogen   | Manual 6 position filter slider               |                                    | Manual 6 position filter slider   |                                    |                                    |           |                     |
|                                   | Selectable multi-wavelength, epi-illumination, Xenon   | Optional with manual 6 position filter slider | Automated 15 position filter wheel | Optional 6 position filter slider | Automated 15 position filter wheel | Automated 29 position filter wheel |           |                     |
| White Light                       | Epi-illumination   | ●   | ●                                  | ●                                 | ●                                  | ●                                  |           |                     |
|                                   | Transillumination  | ●   | ●                                  | ●                                 | ●                                  | ●                                  |           |                     |
| <b>Digital X-ray</b>              |  |   |                                    |                                   |                                    |                                    |           |                     |
| Energy Range                      | Approximately 12-35 kVp  |   |                                    | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Maximum Current                   | Approximately 150 uA   |   |                                    | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Spot Size                         | < 50 U   |   |                                    | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Target Material                   | Tungsten   |   |                                    | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Window Filtration                 | Beryllium  |   |                                    | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Cone of Illumination              | >33 degrees  |   |                                    | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Filtration                        | Aluminum   |   |                                    | 2 filters                         | 4 automated filters                | 4 automated filters                | 2 filters | 4 automated filters |
| <b>Excitation Filters</b>         |  |   |                                    |                                   |                                    |                                    |           |                     |
| Included w/System                 | 18 mm (ex465, ex535, ex625, and ex720)<br>25 mm (ex390, ex430, ex470, ex510, ex530, ex550, ex590, ex610, ex630, ex670, ex690, ex710, ex730, ex770)<br>25 mm (ex390, ex410, ex420, ex430, ex440, ex450, ex460, ex470, ex480, ex490, ex500, ex510, ex520, ex530, ex540, ex550, ex560, ex570, ex590, ex600, ex610, ex630, ex650, ex670, ex690, ex710, ex730, ex770) | ●   | ●                                  | ●                                 | ●                                  | ●                                  |           |                     |
| Available Filters, 18mm           | ex385, ex415, ex430, ex465, ex475, ex515, ex535, ex545, ex555, ex610, ex625, ex635, ex710, ex720, ex 730, ex765  | ●   |                                    | ●                                 |                                    |                                    |           |                     |
| Available Filters, 25mm           | 10 nm increments from 390 nm to 770 nm   |   | ●                                  |                                   | ●                                  | ●                                  |           |                     |
| <b>Emission Filters</b>           |  |   |                                    |                                   |                                    |                                    |           |                     |
| Included w/System                 | em535WA, em600WA, em700WA, em790WA<br>em535WA, em600WA, em700WA, em790WA, ex750, ex830   | ●   |                                    | ●                                 |                                    |                                    |           |                     |
| Standard Accessory                | em440WA, em535WA, em570WA, em600WA, em670WA, em700WA, em750WA, em790WA, em830WA  | ●   | ●                                  | ●                                 | ●                                  | ●                                  |           |                     |
| <b>Performance Specifications</b> |  |   |                                    |                                   |                                    |                                    |           |                     |
| Imaging Area                      | 2 x 2 cm to 20 x 20 cm, continuous zoom  | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Resolution                        | 10 micron/pixel  | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Pixel Size                        | 7.4 µm   | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Data Acquisition                  | 16-bit single capture n-bit data acquisition   | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Dark Current Noise                | 0.003 e-pixels/sec   | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Read Noise                        | <9-rms (nominal)   | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Dynamic Range                     | >4.0 orders of magnitude   | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Binning                           | 1x2, 2x2, 1x4, 2x4, 4x4, 1x8, 2x8, 4x8, 8x8, 16x16   | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| <b>Exposure Modes</b>             |  |   |                                    |                                   |                                    |                                    |           |                     |
|                                   | Single Capture: 0.175 sec-100 min (X-ray min 0.185 sec)  | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
|                                   | Multiple Capture: 0.175 sec-100 min, 32 accumulations max  | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
|                                   | Progressive Exposure: 0.175 sec-100 min per frame, minimum increment = 0.01 sec  | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
|                                   | Time Lapse Exposure: 0.175 sec-100 min per exposure, minimum interval = 0.1 sec  | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| <b>Animal Management</b>          |  |   |                                    |                                   |                                    |                                    |           |                     |
|                                   | Animal Management Chambers   | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
|                                   | Thermal Control Module   | ●   | ●                                  | ●                                 | ●                                  | ●                                  |           |                     |
|                                   | Atmospheric Ports  | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| <b>System Requirements</b>        |  |   |                                    |                                   |                                    |                                    |           |                     |
| Interface                         | IEEE 1394 (FIREWIRE)   | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Operating Systems                 | WINDOWS 2000/XP<br>MACINTOSH OS X  | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |
| Power Requirements                | 120 VAC, 7A<br>230 VAC, 3.5A   | ●   | ●                                  | ●                                 | ●                                  | ●                                  | ●         | ●                   |

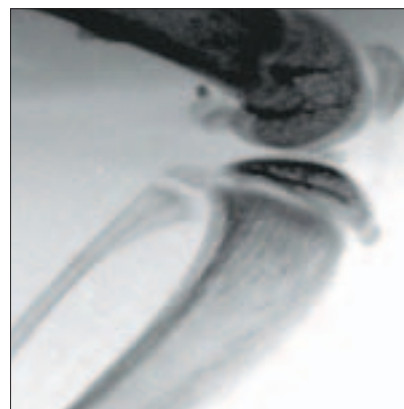
Imaging capabilities include:



Multispectral (fluorochrome unmixing)



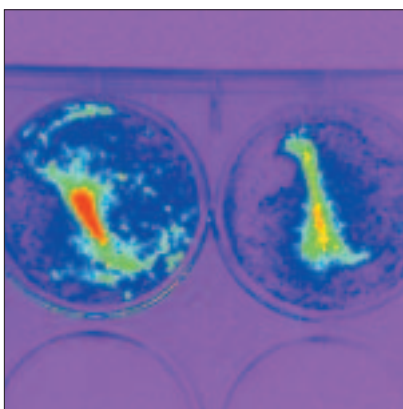
Fluorescent optical image co-registered with white light mouse image



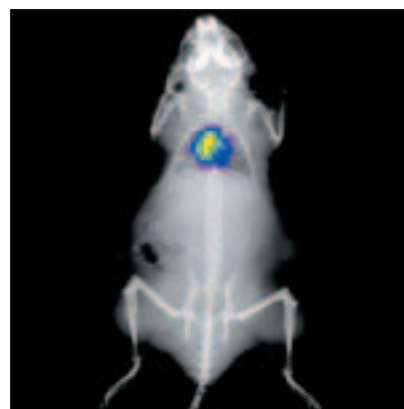
X-ray of mouse knee joint (zoomed)



Three fluorescent images co-registered on X-ray image of a mouse



Luminescence in a 96 well plate (zoomed)



<sup>18</sup>F Radioisotopic image co-registered with X-ray image

## Product Selection Chart

|                       | White Light Imaging | Luminescence | Multi-wavelength Fluorescence 380-780 nm | Multispectral Imaging (Fluorochrome unmixing) | Radioisotopic Imaging | X-ray Imaging |
|-----------------------|---------------------|--------------|--|---|-----------------------|---------------|
| In-Vivo F Series      | ★                   | ★            | ★  |   | ★                     |               |
| In-Vivo FX Series     | ★                   | ★            | ★  |   | ★                     | ★             |
| In-Vivo Multispectral | ★                   | ★            | ★  | ★   | ★                     | ★             |
| DXS Systems           |                     |              |  |   |                       | ★             |

While KODAK Image Stations and KODAK In-Vivo Systems can be used for *in vivo* and *in vitro* molecular imaging of materials, researchers should be aware that the methods of preparing and viewing the materials for molecular imaging may be subject to various patent rights. All images were captured using KODAK Molecular Imaging System Technology.

### Find out more

For more information, to request pricing, an in-lab demo, or to place an order, call 1-877-747-4357, exp. code 7. Outside the U.S.: +1-203-786-5657.

→ [mi.carestreamhealth.com](http://mi.carestreamhealth.com)

**Carestream**  
Molecular Imaging

A division of **Carestream** HEALTH

**Kodak**  
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