Quantum GX2 microCT Imaging System

PRODUCT NOTE

Preclinical *in vivo* Imaging

Key Features:

- High-resolution scanning (2.3 micron voxel)
- High speed scanning mode (3.9 seconds)
- Low dose imaging for longitudinal studies
- Two-phase retrospective respiratory and cardiac gating
- True multispecies imaging of mice, rats, rabbits
- 4 Fields of View (18 mm - 86 mm)
- X-ray filters for optimal imaging protocols

Your Flexible Solution for microCT Imaging

Preclinical microCT is often excluded from use in longitudinal studies due to high radiation doses which could impact the biology of the animal. Additionally, imaging workflows can often be cumbersome and time-consuming and finally, a study might require the use of multiple FOV or imaging resolutions, resulting in the use of multiple microCT systems. The Quantum GX2 microCT imaging system has the flexibility you need by offering the functionality to perform longitudinal studies, across a wide range of species, with high speed, high-resolution scanning *in vivo*.

The system offers increased imaging fields of view to accommodate larger samples *in vivo* and enables high-resolution imaging of *ex vivo* samples. A manual x-ray filter assembly provides opportunities to optimize imaging protocols and coupled with the high-resolution, high-speed integrated platform, the Quantum GX2 enables researchers to gain a better understanding of disease across a broad-range of areas including orthopedic, cardiovascular, pulmonary, and oncology research.

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High-Resolution Imaging: From *In Vivo* To *Ex Vivo*

The Quantum GX2 delivers high-resolution scanning for both *in vivo* and *ex vivo* applications. With multiple fields of view (FOV), the Quantum GX2 allows multispecies imaging from zebrafish to mice to rabbits.

- 18 mm FOV delivers voxel resolution of 2.3 µm ideal for zebrafish or *ex vivo* samples
- 36 mm FOV delivers voxel resolution of 4.5 µm standard for mouse imaging
- 72 mm FOV delivers voxel resolution of 9.0 µm for samples such as rats and rabbits
- 86 mm FOV enables imaging of rat lungs in a single scan

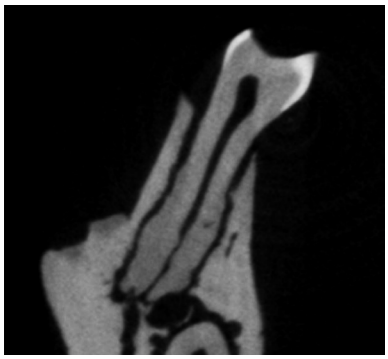


Figure 1. With resolutions as low as 2.3 micron voxel achievable, the Quantum GX2 allows the researcher to visualize small structures, like the root of a mouse molar in the image above.

Subvolume Reconstructions Maintain Superior Workflow

The Quantum GX2 microCT system features an advanced subvolume reconstruction workflow, creating high-resolution images from original whole image scans. A wide FOV high-resolution scan is acquired and regions of interest (ROI) are then defined to perform the subvolume reconstruction workflow. This functionality improves overall experimental workflows, enabling high-resolution images to be generated without the need to rescan animals, reducing time and x-ray doses.

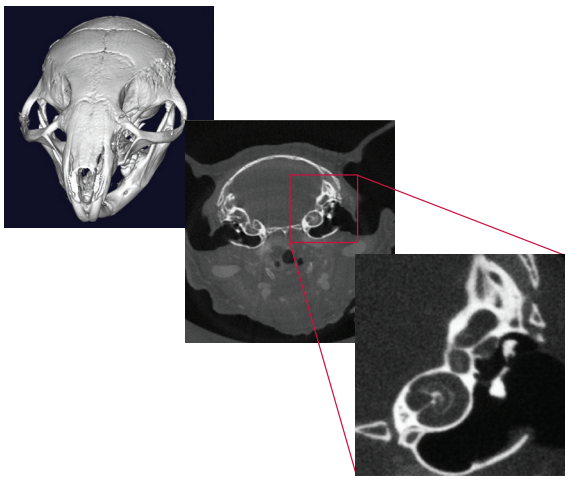


Figure 2. The Quantum GX2's subvolume reconstruction feature allows a large FOV image to be acquired in vivo, then reconstructed down to higher resolution without the need to rescan a mouse. This example shows a mouse skull with a subreconstruction highlighting the hearing bones in the ear.

Two-phase Retrospective Cardiac and Respiratory Gating

Accurate microCT reconstructions often require reducing motion artifacts due to cardiac and respiratory motion. The Quantum GX2 utilizes proprietary algorithms to retrospectively gate the microCT data, reducing heart and diaphragm motion. This is accomplished by drawing an ROI (region on interest) over the diaphragm and/or apex of the heart. The scan is run and a trace of inspiration/expiration, diastole/systole is created and reviewed prior to image reconstruction. This workflow is ideal for *in vivo* cardiac and respiratory applications, while maintaining the Quantum GX2's advantageous high throughput *in vivo* scanning capabilities.

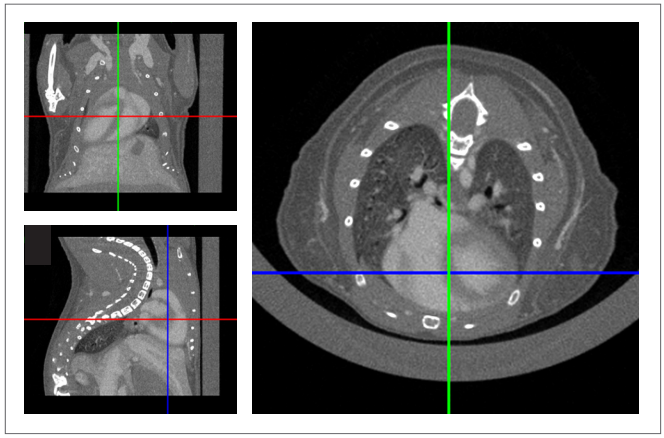


Figure 3. Improved cardiac gating algorithms reduce motion artifacts and facilitate retrospective gating. A mouse heart scanned using a four minute gated scan with CT contrast.

X-ray Filter Assembly

The ability to change the filtering of x-rays enables investigations into additional applications where conventional Al/Cu filtering is not ideal. The Quantum GX2 has a filter assembly and six insertable filters, allowing the researcher to select different filtering settings for their scans.

Table 1. The Quantum GX2 comes with 6 changeable filters for optimization of imaging protocols.

Filter	Potential Application
No filter (open)	Low contrast samples at low voltages
Al 0.5 mm	Low contrast samples
Al 1.0 mm	Soft tissue (fat analysis)
Al 0.5 mm + Cu 0.06 mm	Standard CT scanning
Cu 0.1 mm	Dense samples at high voltages
Cu 0.2 mm	Metal containing samples

True Multispecies Imaging

Whether your disease model is developed in a mouse, rat, guinea pig, or rabbit, the Quantum GX2 offers the flexibility to image across multiple species. With a 163 mm bore size, a full rabbit (~5 kg) can be placed in the imaging bore.

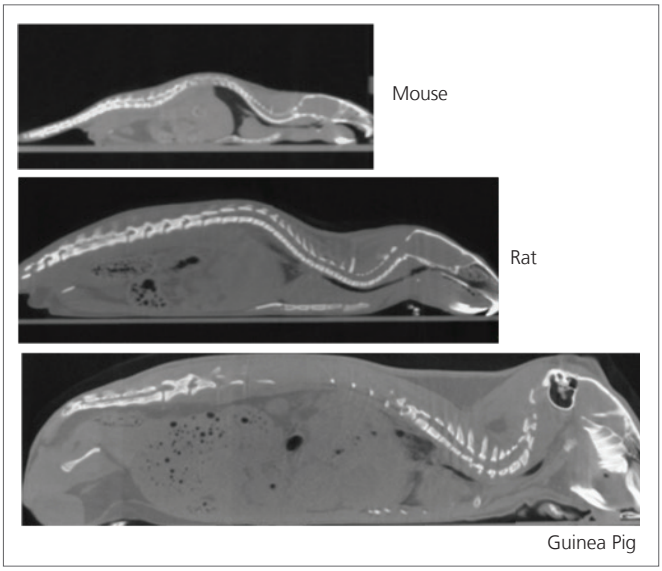


Figure 4. With a large bore size, the Quantum GX2 enables true multispecies imaging.

Co-register Optical Signals With Ease

Use the 3D multimodality module with integrated fiducial markers to seamlessly co-register optical signals from PerkinElmer's IVIS® Spectrum and FMT® 3D platforms.

Figure 5. Gain greater insights into disease biology by incorporating multiple modalities with ease. Optical co-registration of luciferase labeled MDA-MB-231 cancer metastases acquired on an IVIS Spectrum combined with Quantum microCT data.

Advanced Bone Analysis with AccuCT™

Streamline your analysis and improve consistency with PerkinElmer's AccuCT advanced bone analysis software. As a companion to the Quantum GX2, AccuCT offers a microCT 3D visualization and automated analysis tool.

Designed to automatically segment bones and perform ASBMR morphometric analysis, AccuCT enables researchers at all levels of experience to perform advanced bone analysis in a user-friendly workflow-based software package. In addition to facilitating data analysis, AccuCT's 3D rendering capabilities produce high impact images for manuscripts and presentations with just a few mouse clicks.

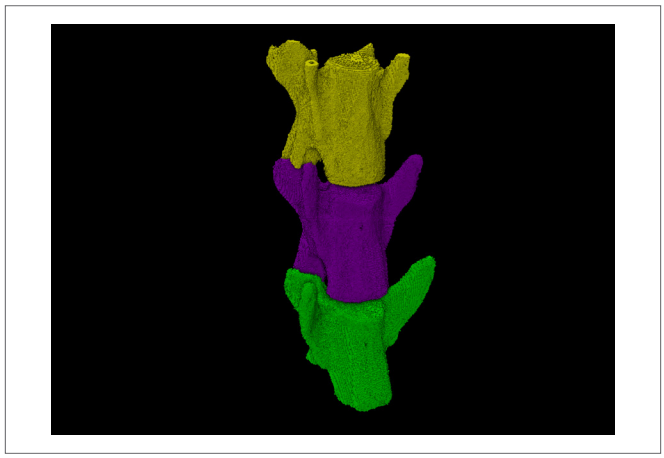


Figure 6. AccuCT automates bone identification, segmentation and analysis.

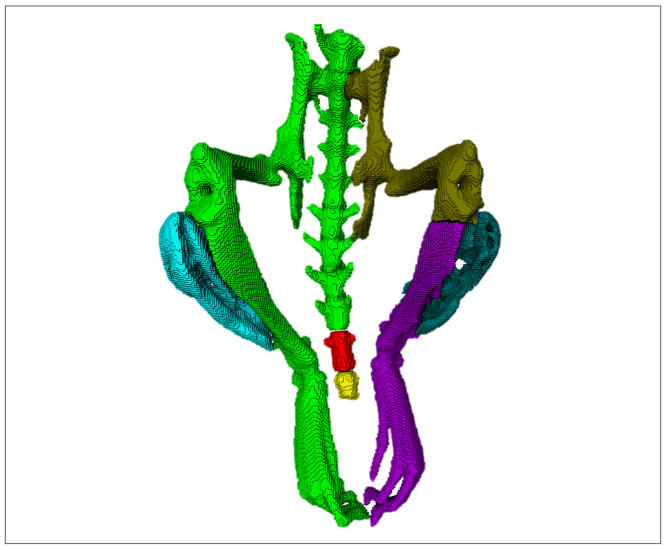


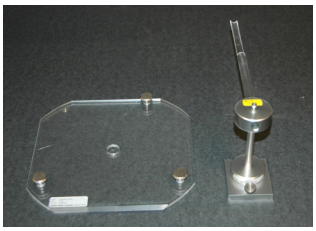
Figure 7. Investigate new applications, like ectopic bone growth, with advanced algorithms for improved bone identification and segmentation.

Inside the Quantum GX2

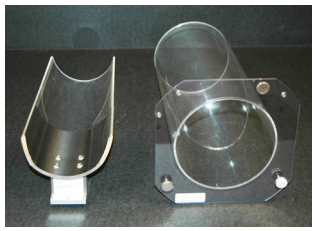
- Flat Panel CMOS Detector
- Full 360 degree, continuous rotation gantry
- Cone-beam microfocus x-ray source
- 163 mm imaging bore, 4 FOV (18 mm, 36 mm, 72 mm, 86 mm)
- Six filter changer assembly
- Integrated anesthesia

Standard Accessories

- X-ray filter changer assembly with five interchangeable filters
- 18 mm sample bed and bore cover
- 36 mm sample bed and bore cover
- 72 mm sample bed and bore cover
- 86 mm sample bed



18 mm Sample Bed and Bore Cover



Rabbit Bed with 72 mm Bore Cover

Optional Accessories

- Syringe injection system
- RAS-4 Rodent anesthesia system
- AccuCT advanced bone analysis software
- Multimodality modules for IVIS Spectrum and FMT (animal bed and software)
- Rabbit imaging bed

IVIS Syringe Injection System

RAS-4 Rodent Anesthesia System

Table 2. Quantum GX2 microCT imaging system.

System Components	Specifications
CT Resolution	2.3 micron (min)
CT Field of View (X, Y)	18 mm – 86 mm
X-ray Tube Maximum Voltage	90 kVp
X-ray Tube Current	200 uA
X-ray Tube Maximum Output	8 W
CT Detector	Flat panel CMOS
CT Detector Frame Rate	117 fps (maximum)
CT Gantry Bore Size	163 mm
Scan Times	High Speed: 3.9 Seconds, Eight Seconds Standard Speed: 18 Seconds, Two Minutes High-resolution: Four Minutes, 14 Minutes, 57 Minutes
Imaging System Space Requirement	1450 x 980 x 930 mm (H x W x D)
Imaging System Weight	450 kg
Computer (Minimum Specifications)	Windows® 7, 4 GB RAM, nVidia Quadro 600, 250 GB and 1 TB HD, 24" Widescreen LED Monitor
AccuCT Computer (Minimum Specifications)	Windows® 8 (64-bit), 16 GB of RAM, Intel i7 processor , NVidia graphics card that supports OpenGL 4.0

For more information, please visit www.perkinelmer.com/invivo

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