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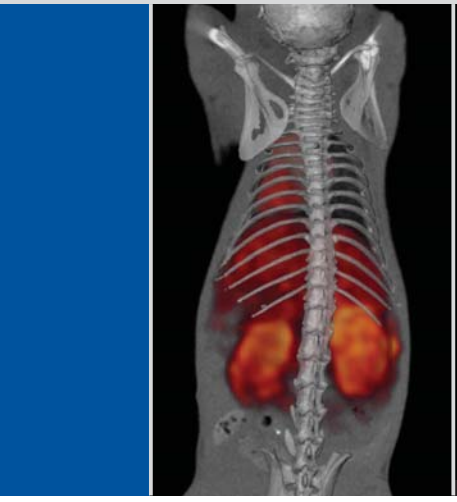
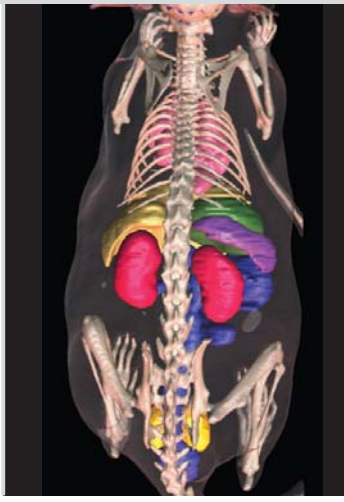


microCAT® +SPECT

SIEMENS
medical

microCAT at a Glance

Designed to meet the throughput, resolution and image quality requirements of academic and pharmaceutical research, the Siemens microCAT® sets the standard for *in vivo* preclinical micro computed tomography. With a range of x-ray source and detector configurations available, the ability to adjust the scanner magnification between scans, and a suite of image reconstruction and data analysis tools, the microCAT is the most versatile instrument in its class.

Key Features

- Industry leading combination of resolution and Field of View (FOV)
- Unique capability to adjust x-ray source and detector positions for user-selected resolution and Field of View
- Superior image quality due to low-noise CCD detectors
- Multiple options for high speed image reconstruction
  - Dedicated Real Time Reconstruction
  - Linux Cluster Hardware/Software Solution
  - Linux Cluster Software-only Solution (for customers with existing clusters)
- Compatibility with microPET® scanners
- Optional SPECT detector for integrated SPECT/CT
- Dedicated preclinical service and applications support team

Gantry

The microCAT gantry is a fully shielded enclosure with redundant safety interlocks in compliance with US FDA standard 21 CFR 1020.40. The gantry is divided into three major components. The upper imaging compartment houses the animal bed, x-ray source and detector and all moving components. The lower compartment houses all support electronics. The detachable front bore shield provides easy access to the animal under test while providing complete radiation shielding to the operator. The gantry rests on retractable vibration isolation pads, which may be raised to allow the gantry to roll between laboratories on its heavy-duty castors. The gantry is sized to fit through standard laboratory doors when the front shield is detached.

X-ray Source

Standard Source: The standard source is a 40W, tungsten anode, 35-80 kVp source with <50-micron focal spot. This source provides a high x-ray flux for high speed scanning and a large cone angle for high magnification studies. The maximum achievable resolution with this x-ray source and the standard detector is 27 microns. Typical scan times are less than 5 minutes.

Optional Variable-focus Source: For ultra-high resolution studies, an optional x-ray source is available which can operate in microfocus mode (<6 micron focal spot) providing a maximum resolution of 15 microns (10% MTF) with both detector options. The same source can operate with a larger focal spot at up to 65W for high speed studies.

X-ray Detector

Standard Detector: The standard x-ray detector has 2048 x 3096 pixels and is designed for high-speed, low-noise, whole-mouse imaging. The detector may be configured for a Field of View as large as 8 cm x 5.4 cm. The raw data is 12 bits deep and the detector dynamic range is 69 dB with 1 x 1 binning and 72 dB with 2 x 2 and 4 x 4 binning. The maximum achievable resolution with this detector and the standard x-ray source is 27 microns. With the optional micro-focus x-ray source, the maximum resolution is 15 microns.

Large Area Detector: For larger animals, an optional detector is available with 4096 x 4096 pixels, providing a maximum Field of View of 11 cm x 11 cm. With this detector, the Field of View is software selectable through the graphical user interface, permitting the operator to crop each data set to match the geometry of the subject. This detector also has a superior signal to noise ratio with 14-bit readout and dynamic ranges of 67 dB with 1 x 1 binning, 79 dB with 2 x 2 binning and 84 dB with 4 x 4 binning. The maximum achievable resolution with this detector and the standard x-ray source is 27 microns. With the optional micro-focus x-ray source the maximum resolution is 15 microns.

Specifications	microCAT
Standard Detector	
Number of detector pixels	3072 x 2048
Typical Operation FOV	
Mouse Configuration	8 cm (axial) x 5.4 cm (transaxial)
Rat Configuration	5.4 cm (axial) x 8 cm (transaxial)
Large Area Detector	
Number of detector pixels	4096 x 4096
Typical Operation FOV	11 cm (axial) x 11 cm (transaxial)
Standard X-ray source	
Maximum power	40 W
Focal spot size	< 50 microns
Voltage range	35 – 80 kVp (additional shielding required for operation above 80 kV)
Maximum anode current	500 microAmps
Microfocus X-ray source	
Maximum power	65 W
Focal spot size	< 6 microns @ 8W; < 60 microns @ 65W
Voltage range	20 – 130 kVp
Maximum anode current	500 microAmps
Spatial resolution	
Maximum FOV	37 microns (10% MTF)
High resolution mode with microfocus x-ray source	15 microns (10% MTF)
Minimum scan time	
360 step scan	<6 minutes
180 step scan	<3 minutes
Continuous rotation	<1 minute
Reconstruction	
Algorithm	Modified Feldkamp algorithm
Speed with real time reconstruction	512^3 volume reconstructed during scan time.
Software	
	• Integrated graphical user interface for data acquisition, image reconstruction and data visualization. • Amira™ 3D visualization and volume modeling package. • 16-bit RAW, BMP and DICOM 3 output formats.
Safety	
	Fully shielded cabinet with redundant safety interlocks. FDA registered. Complies with standards set by US FDA, Center for Devices and Radiological Health (21 CFR 1020.40).

microCAT Features

Animal Bed
Three styles of detachable animal beds are available:

- Mouse bed for up to 50 mm diameter animals
- Rat bed for up to 100 mm diameter animals
- Miniature bed for high resolution CT studies of small samples and for high resolution SPECT studies

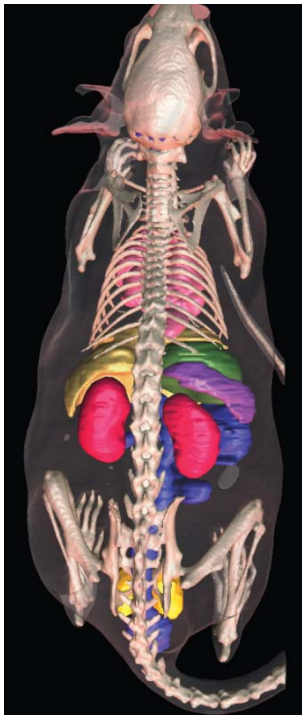
Each removable animal bed is interchangeable with Siemens microPET beds for easy transport of animals between instruments in dual modality studies. Positron emitting fiducial markers visible in the x-ray CT data set may be incorporated into the beds for easy image registration.

Respiratory Gating
The microCAT is configured to accept respiratory gating signals from Biopac™ and BioTRIG™ physiological monitoring systems.

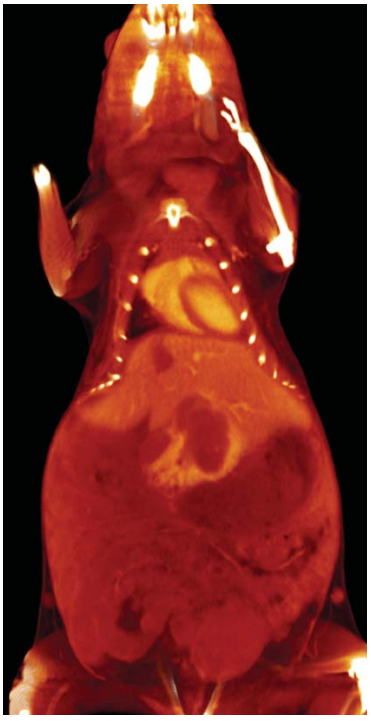
Precision Motion Systems
High-resolution images require high-precision moving components. Only the highest quality motion systems are employed in Siemens preclinical scanners.

microSPECT
All microCAT systems can be configured with or upgraded to include a state-of-the-art SPECT imaging system for anatomic and functional data acquisition on a single platform.

Applications

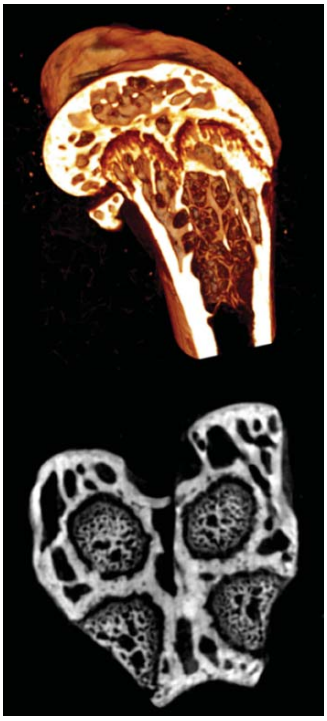


Segmentation tools provide accurate quantification of anatomic data.



Newly available preclinical microCAT contrast agents provide previously unattainable soft tissue and vascular image contrast. Image courtesy of Oak Ridge National Laboratory.

All microCAT systems can be configured with optional high resolution SPECT detector heads for multi-modality studies. Image courtesy of the University of Tennessee Graduate School of Medicine, Knoxville, TN.



With the optional variable focus x-ray source, images down to 15 micron resolution can be acquired in vivo.

Specifications	microCAT
Unit weight	Approximately 1800 lbs (820 kg)
Unit height	70 in (1780 mm)
Unit width	49 in (1245 mm)
Unit depth (without front shield)	33 in (840 mm)
Unit depth (with front shield)	55 in (1395 mm)
Temperature and Humidity	
Operating room temperature	45° – 75° F (7 – 24 C)
Operating humidity:	30 – 70% non-condensing
Note: The maximum power consumption of the microCAT system is 2 kW (6800 BTU/hr).	
Electrical Requirements	
microCAT and computer	110V/20A isolated outlet (20A outlet required)
	240V/10A (Europe)
Note: Appropriate power connection will be provided for destination country.	
Magnetic Field	
Magnetic field strength must be less than 10 Gauss.	
Radiation Safety	
	The microCAT is a cabinet x-ray system. The scanner is FDA registered and compliant with title 21 of the Code of Federal Regulations, Part 1020.40 (21 CFR 1020.40).

microCAT +SPECT at a Glance

Siemens microCAT +SPECT generates high resolution, fully registered SPECT/CT data sets. With the largest commercially available pixilated detector heads, an extensive set of collimators, multiple energy windows, and independently adjustable detector head positions, the microCAT +SPECT sets the standard for preclinical multimodality imaging.

Key Features

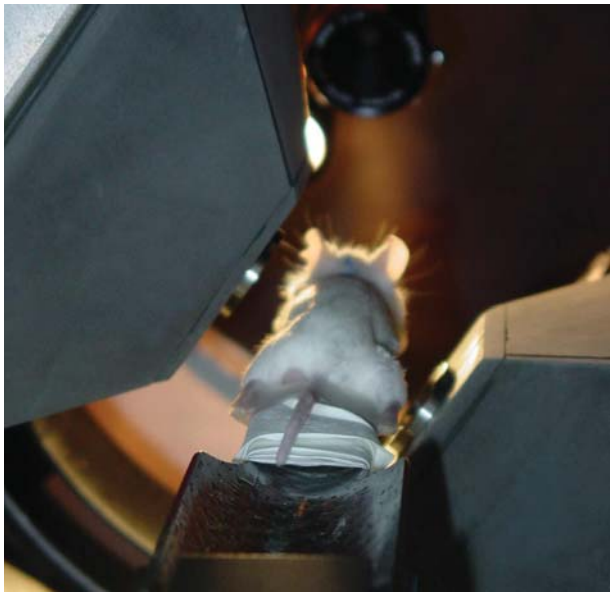
- Largest commercially available pixilated detector heads – 150 mm x 150 mm
- Large detector heads permit greater pinhole magnification, improving sensitivity while maintaining large Field of View
- Small pixels provide high resolution, even at low magnification and with parallel-hole collimators
  - +SPECT data acquisition system is fully integrated into the microCAT hardware and software
  - microCAT beds are compatible with microPET scanners for easy dual and triple modality studies
  - microCAT +SPECT data sets are fully compatible with the microPET ASIPro software package

Detector Heads

- 150 mm x 150 mm active area
- Array of position sensitive photomultiplier tubes and pixilated NaI(Tl)
- 2.0 mm x 2.0 mm x 10 mm crystals
- 2.2 mm crystal spacing
- 4,600 pixels per detector head

Collimators

- Parallel hole (1.2 mm and 2 mm aperture)
- Pinhole (0.5 mm, 1 mm, 2 mm, and 3 mm inserts)
- Multi-pinhole collimation will be introduced in early 2006



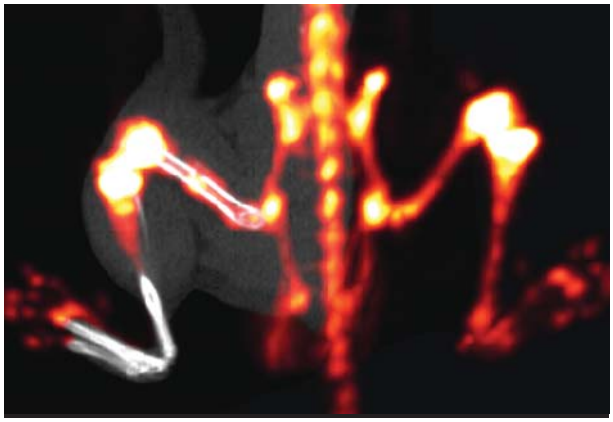
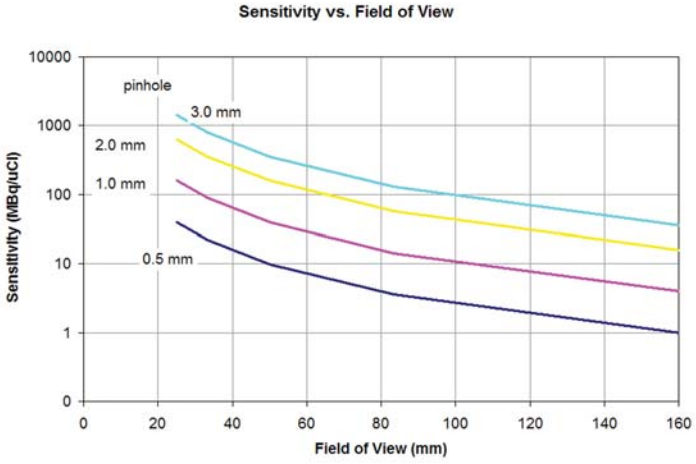
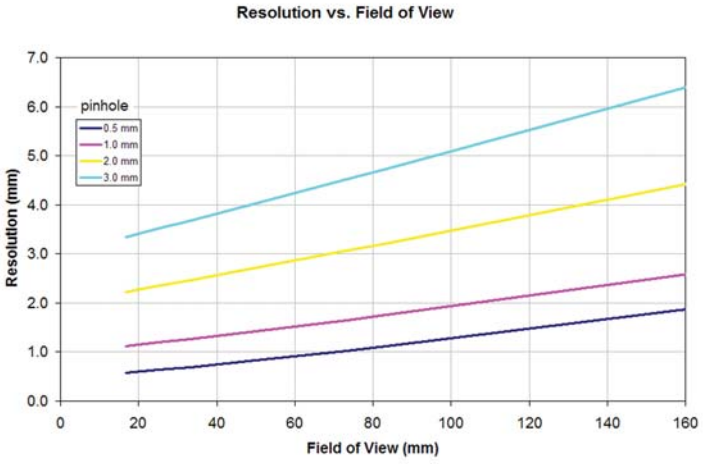


Image courtesy of VA Hospital, Columbia, MO.





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