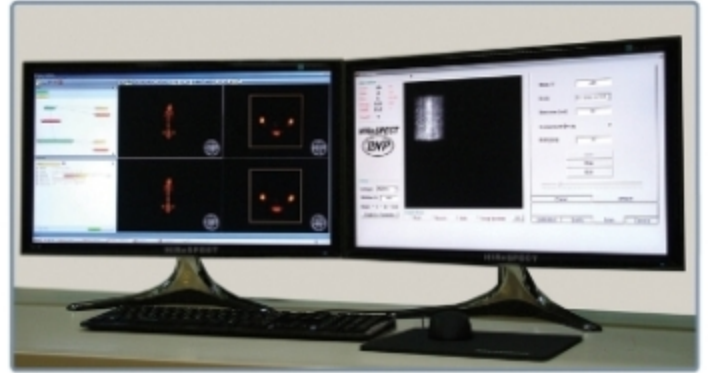# HiReSPECT Workstation
## High Resolution Animal SPECT Imaging System

High performance Intel®Core™ i3 3.1 GHz based workstation with dual monitor configuration


High sensitivity 15 inch touch screen LCD monitor attached to the gantry for data acquisition and motion control


A flexible platform for 3D visualization requirements satisfies even your most demanding needs to work with preclinical image data handling and quantification
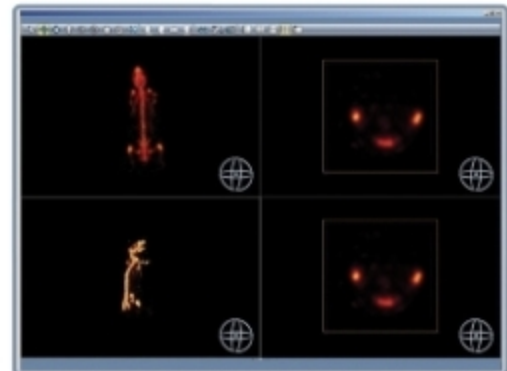
User friendly data acquisition and reconstruction software running simultaneously on two separate monitors
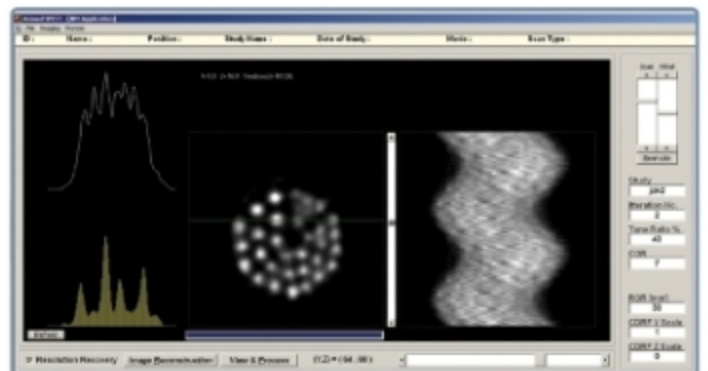
The developed acquisition software offers fully automated platform for dynamically applying Linearity, Energy, Uniformity and Center of Rotation correction.
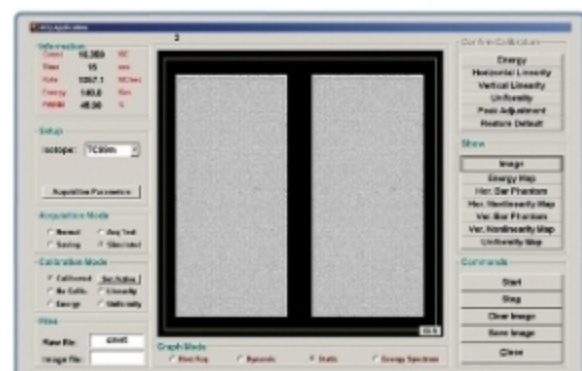
HiReSPECT Image Reconstruction
High Resolution Animal SPECT Imaging System

The HiReSPECT system uses a newly developed accelerated iterative reconstruction algorithm with adjustable percentage of resolution recovery using accurate modeling of collimator detector response.

Micro Deluxe Phantom images before and after Rotation-based Pixel-driven resolution recovery method.

Without RR   With RR
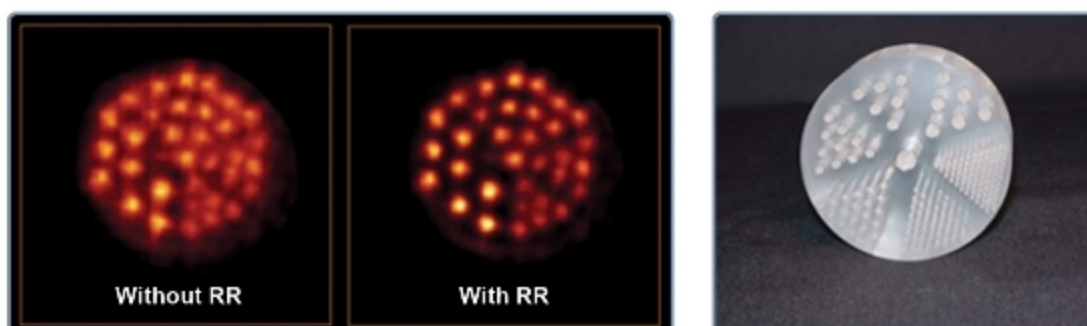
Tc-MDP SPECT image of mice using HiReSPECT Scanner. Imaging with Tc-methylene diphosphonate (Tc-MDP) is the initial method of choice to detect skeletal metastases in cancer.
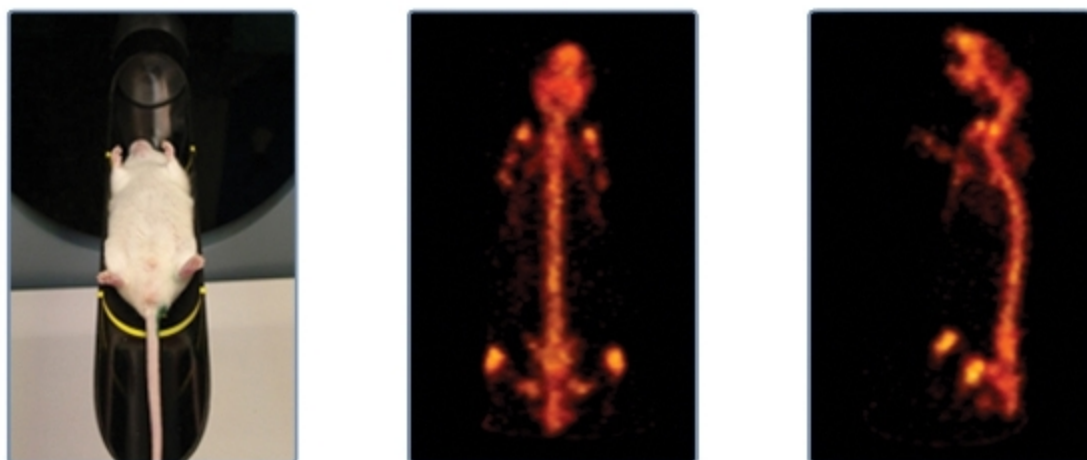
Tc-DMSA SPECT image of mice using HiReSPECT Scanner. Imaging with Tc-Dimercapto succinic acid (Tc-DMSA) is the initial method of choice of renal scintigraphy.
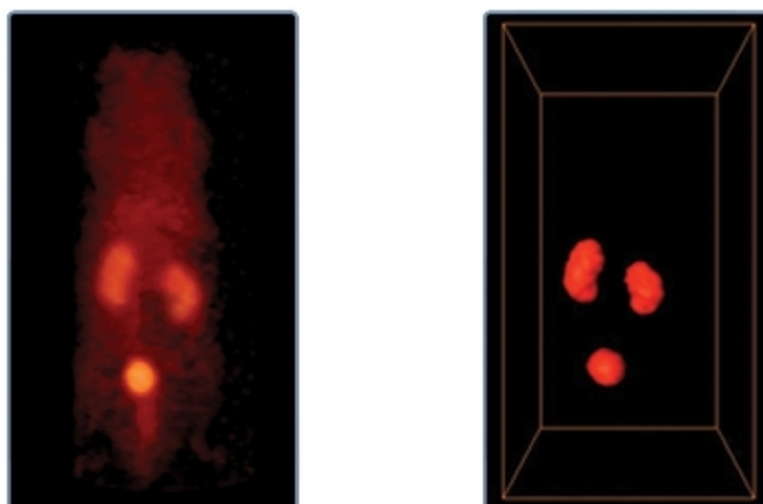
HiReSPECT Platform
High Resolution Animal SPECT Imaging System

Detector Architecture

The HiReSPECT pre-clinical system detector design includes the latest technology for detection of gamma radiation with high accuracy including pixelated scintillator crystal with the FOV of 50x100 mm^2 and position sensitive H8500 PMT.
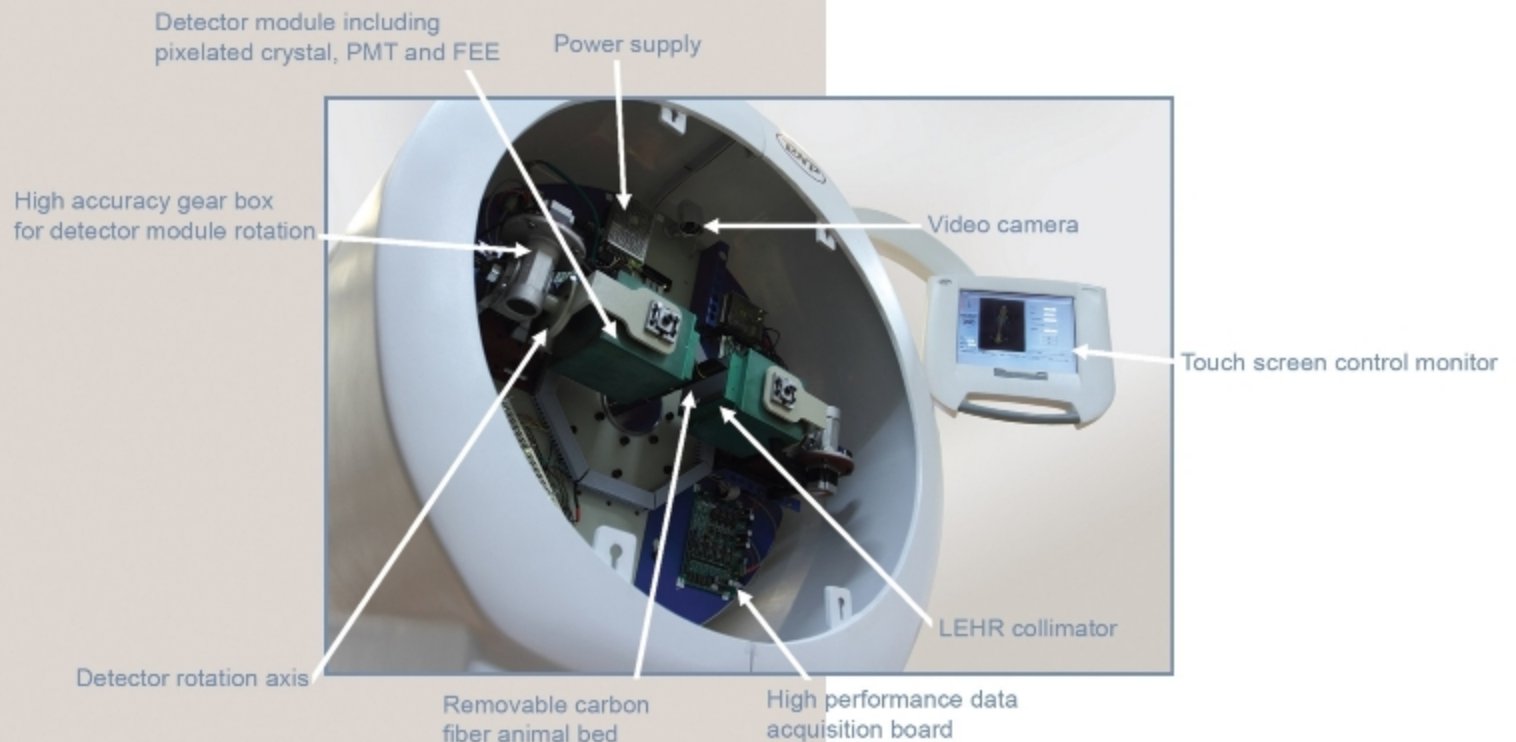
Integrated Front End Electronic

HiReSPECT's versatile data acquisition electronics provides optimal SPECT performance on a platform designed as a true molecular imaging system.

Networked computers embedded in the gantry coordinate SPECT data acquisition, and an innovative nuclear pulse processing and event handling architecture for high resolution high count rate gamma ray processing are used in the system.

Mechanical Design

HiReSPECT uses high performance and reliable dual head configuration (Can upgrade till four heads) with the possibility of head rotation for imaging of bigger animals such as rat and rabbit.

Detector module including pixelated crystal, PMT and FEE

Power supply

High accuracy gear box for detector module rotation

Video camera

Touch screen control monitor

Detector rotation axis

Removable carbon fiber animal bed

High performance data acquisition board

LEHR collimator
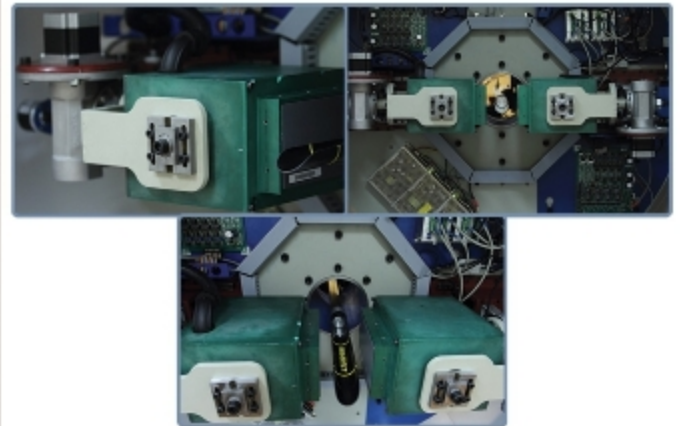
HiReSPECT
High Resolution Animal SPECT Imaging System

HiReSPECT provides the highest performance and versatility available to address your preclinical imaging research needs from academic and translational research, to drug discovery and development.

The **HiReSPECT** is a Dual Head Small Animal SPECT (Single Photon Emission Computed Tomography) imaging system that provides in vivo high resolution three-dimensional (3D) images of physiological functions in small laboratory animals.

Application: Small animal imaging is an emerging field which has an impact on various biomedical research areas such as neurology, oncology, cardiology, immunology and infection biology.
The pharmaceutical industries and research centers will profit from SPECT system as they accelerate drug and biomarker development by yielding more reliable in vivo results and cost effective study design.
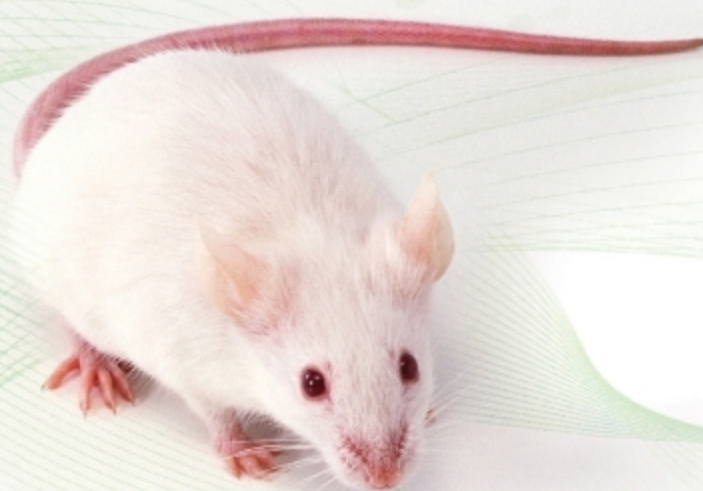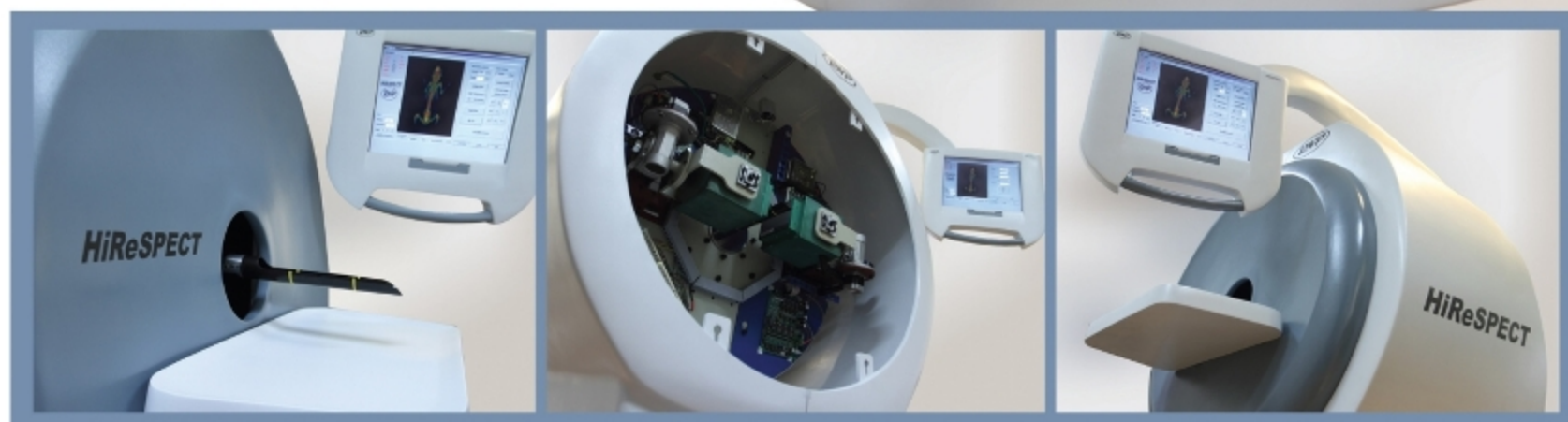
HiReSPECT Different Views

High Resolution Animal SPECT Imaging System

HiReSPECT Specifications
High Resolution Animal SPECT Imaging System

Parameter	Description	Comment
Detector Specifications		
Number of Detector Heads	2	4 optional
Crystal Material	CsI(Na)	Pixelated
Crystal Size	100×50 mm^2	Total Area
Crystal Element Size	$1 \times 1 \times 5$ mm^3	Separated by Epoxy
Crystal Element Pitch	1.2 mm	0.2 mm Inter Crystal Area
Active Area Per Detector Head	96×45.6 mm^2	Active Area
Number of Crystal Elements Per Head	3040	-
Number of PSPMTs Per Head	2	H8500 (H9500 optional)
Collimator Type	Parallel Hole	Hexagonal
Collimator Specifications	$1.2 \times 0.2 \times 34$ mm^3	Hole×Septa×Hole Lenght
Intrinsic Spatial Resolution	1.2 ± 0.1 mm	-
SPECT System Resolution	1.8 ± 0.2 mm	At Minimum Distance
Planar Resolution	1.5 ± 0.1 mm	At Collimator Surface
Electronic Specifications		
Readout Electronic Method	Subtractive Resistive	-
Signal Acquisition Method	Peak Detection	-
A/D Resolution (High Precision)	> 14 bit	-
Acquisition Board Interfacing	USB	-
Acquisition Board Signal Channels	4	-
Digital Energy Correction	Yes	-
Digital Linearity Correction	Yes	-
Digital Uniformity Correction	Yes	-
Mechanical Specifications		
Stand Design	Ring Gantry	Step and Shoot and Continuous
SPECT Rotation and Bed Motion	Motorized	-
Rotation Resolution	<0.04 deg	-
Rotation Speed	>12 deg/sec	-
Rotation Angle Reading & Display	Digital	-
Detector Rotation Range	≥ 90 deg	-
Detector Radius Range	up to 15 cm	-
Inside Video Camera	Yes	-
Total System Weight	300Kg	With Dual Head Configuration
System Dimension	$1.5 \times 2.2 \times 2.4$ m^3	W× H× L
Image Reconstruction and Analysis		
Acquisition Mode	Planar & Tomography	-
Projection Matrix	38×80	Tomographic Mode
SPECT Image Matrix	$128 \times 128 \times 256$	Default
Resize Algorithm	Bilinear & Bicubic	In planar mode
Planar Image Matrix	128×256 or 256×512	Default
Image Reconstruction Method	FBP, MLEM, OSEM	using multiple innovative techniques
Resolution Recovery Method	Rotation-Based Pixel-Driven	Adjustable Percentage of Recovery
Decay Compensation	Yes	Through variable acq. time
SPECT 3D Image Rotation	Yes	-
SPECT 3D Image Zooming	Ycs	-
Multiple Color Palette Selection	Supported	-
Quantitative Measurements	Yes	-
Workstation		
CPU	Intel®Core™ i3 3.1 GHz	Upgradable
Hard Disk	500 GB	1 TB optional
RAM	4 GB	8 GB optional
Monitor	$2 \times 24''$ High Resolution LED Monitor	15″ LCD Touch Screen Monitor on Gantry