

Looking at drug discovery

in a whole new way



M I C R O P E T
A WHOLE NEW PERSPECTIVE

Realizing the benefits of a new point of view

How does microPET® work?

microPET® is a molecular imaging technology that, when combined with appropriate radiotracers, can assess a wide range of molecular targets and events *in vivo*. A positron-emitting labeled compound injected into a subject distributes throughout the body and accumulates in tissue. This accumulation occurs by either binding to specific molecular targets, or by enzymatic or metabolic trapping in cells. microPET® is then able to generate quantitative, volumetric images representative of this compound's distribution as well as its temporal rate of change. Through this process, microPET® provides images representing substrate metabolism, specific receptor distribution, enzymatic activity, drug pharmacokinetics and pharmacodynamics, DNA synthesis, gene expression and many other bio-molecular processes.

Researchers around the world are currently using microPET® to:

- Assess new pharmacological agents in drug development
- Assess drug delivery and gene therapy approaches
- Study animal models of human disease and new therapeutic approaches in these models
- Study genetically engineered animals
- Develop new molecular imaging assays
- Develop new radiotracers for use in diagnostic imaging

Flexibility

microPET® is used to image a wide range of laboratory animals. The ability to make repeat measurements in individual animals is particularly valuable in animal models that have high intrinsic value or that exhibit high variability.

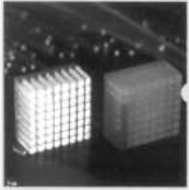
microPET® is offered in two configurations:

- microPET® P4, with a bore size of 22 cm, can accommodate a wide range of animal models including mice, rats, rabbits and non-human primates
- microPET® R4, with a bore size of 12 cm, for the dedicated use of smaller rodents (mice and rats)

Ease of Use

Both models of microPET® feature easy-to-use, Windows®-based software. Data acquisition is controlled by microPETManager™, a user-friendly interface that enables an unlimited number of acquisition and post-processing protocols to be set up, saved and categorized. The raw data are stored in list-mode format, which gives the user tremendous flexibility for histogramming the data into sinograms for later reconstruction into images. The display, analysis and setup of the system are controlled through ASIPro™, which provides advanced data analysis and visualization functionality, including simultaneous viewing and linking of images and sinograms, as well as an image/sinogram calculator that can preview and save normalized and attenuation-corrected emission files.

microPET
PRIMATE P4
CONCORDE



LSO Crystals

Fast, bright and high-stopping-power scintillator, leading to excellent sensitivity, timing resolution, energy resolution and count-rate performance.



Laser Alignment System

Assures that the selected region of interest is located precisely in the center of the field of view.

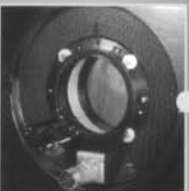


Detector Technology

Optimized for small-animal imaging using LSO blocks coupled to position sensitive PMTs via fiber optics.

**Continuous Bed Motion/
Removable Bed Pallet**

Continuous movement is computer-controlled. The pallet, made of 100% composite materials, is removable for use in various modalities.



**Attenuation Correction
and Normalization**

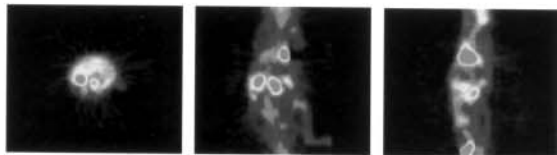
Transmission, normalization and blank acquisitions are obtained using a point source that is rotated and translated in a helical orbit through the field of view for full coverage of all the crystals.

Discovering the advantages of greater clarity

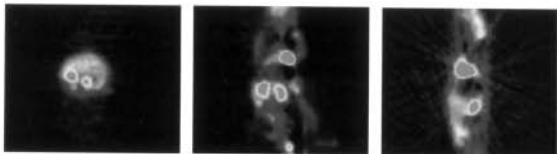
Defining the future with microPET®

Scientists from around the globe are using microPET® to push their research to new heights. Pictured below is a small sampling of recent research being conducted with microPET®.

microPET® P4: Whole-Body FDG Mouse Image



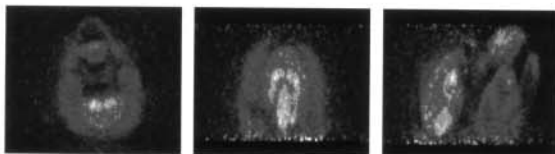
Mouse Position: Axially
4 bed positions, 20 minutes per bed position



Mouse Position: Transaxially
1 bed position, 30-minute scan

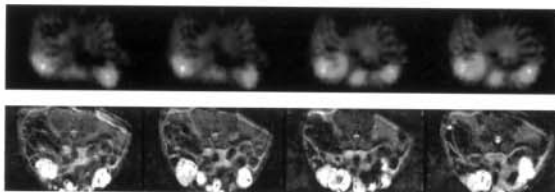
Images courtesy of University of Cambridge, UK

microPET® P4: Non-Human Primate Data



Images courtesy of Dr. John Votaw, Emory University, Atlanta, GA

microPET® R4 and MRI: Hamster Images



Abdominal GW39 Tumors (week 6)
1 mCi ¹⁸F, 1 hour post injection

Images provided by Mallinckrodt Institute of Radiology and Washington University, St. Louis, MO

JS Lewis et al., *J Labelled Compds Radiopharms* 2001; in press.
JS Lewis et al., *Eur J Nucl Med* 2000;8:952P

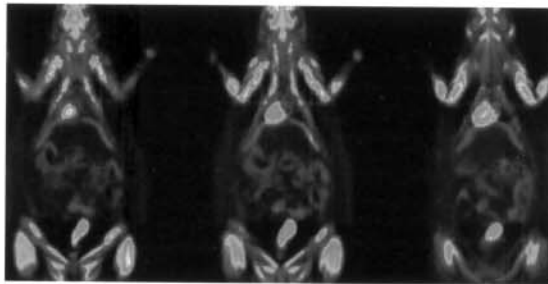
microPET® R4: ¹⁸F Bone Scan



5.5 MBq, 100-minute scan

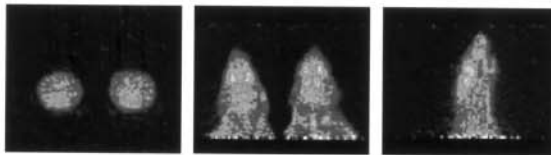
Images courtesy of Max-Planck-Institute for Neurological Research, Cologne, Germany

microPET® P4: Whole-Body Rat ¹⁸F-FDG



Images provided by Crump Institute for Molecular Imaging, Los Angeles, CA

microPET® P4: [¹⁸F]FECNT Rat Study



60-minute scan

Images courtesy of Dr. John Votaw, Emory University, Atlanta, GA

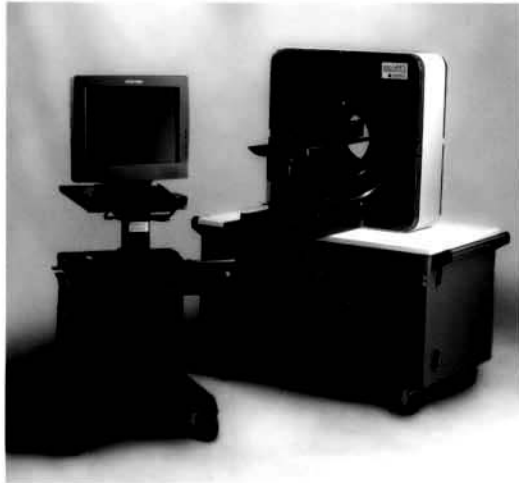
microPET® R4: FMZ Dynamic Rat Study



~70-minute scan, frame 9 of 15

Images courtesy of Dr. M. Kilbourn, University of Michigan, Ann Arbor, MI

AT A GLANCE



Targeting the needs of molecular imaging, biology, and pharmaceutical labs, microPET® is a dedicated small animal PET scanner. Offering the best sensitivity and resolution of any full ring PET system, microPET® is available in three models to accommodate a wide variety of research applications and budgets.

The microPET® R4 is the lowest priced, full ring PET system in the world. Despite its low cost the microPET® R4 outperforms every competing system in terms of count rate performance, energy resolution, timing resolution, and feature set.

Utilizing Concorde's proprietary Focus™ detector technology and possessing virtually the same imaging volume as the R4, the microPET® Focus™ 120 offers the highest sensitivity of any commercially available PET system. Focus™ systems also possess the highest spatial resolution of any scintillator based PET system. The combination of high resolution and sensitivity gives the Focus™ 120 uncompromised performance and unmatched quantitative accuracy for dynamic and static imaging.

Utilizing Focus™ detector technology, the microPET® Focus™ 220 possesses resolution, sensitivity, and a large imaging volume providing for the flexibility to image multiple mice or large primates without compromising image quality.

Specifications	microPET® R4	microPET® Focus™ 120	microPET® Focus™ 220
Detector Diameter (cm)	15	15	26
Bore Size (cm)	12	12 / 15*	22 / 26*
Transaxial Active Field of View (FOV in cm)	10	10	19
Axial Field of View (cm)	7.8	7.6	7.6
Number of Detector Blocks	96	96	168 <i>4x42</i>
Total Number of LSO Elements	6,144	13,824	24,192 <i>168x12x12</i>
Pixel Element Size (mm ³)	2.1 x 2.1 x 10	1.5 x 1.5 x 10	1.5 x 1.5 x 10
Absolute System Sensitivity (%) **	4.0	6.5	4.0
Resolution at Center of FOV (mm)	≤ 1.8	≤ 1.3	≤ 1.3
Average Energy Resolution (%)	≤ 18	≤ 18	≤ 18
Volumetric Resolution (Center FOV) (ul)	≤ 7.0	≤ 2.5	≤ 2.5
Volumetric Resolution (Central 8 cm) (ul)	≤ 35	≤ 9	≤ 9

Features†

Variable Timing Window: 2, 6, 10, 14, nsec	Normalization (point source or cylinder acquisition)
Variable Energy Window: 0-814 keV	Deadtime Correction
Reconstruction Algorithms: 2D OSEM, 3D OSEM, 2D FBP, 3D RP, 3D MAP, 3D OSEM+MAP	Scatter Correction
Point Source Holder with Computer-Controlled Helical Trajectory	Decay Correction (> 24 Isotope supported)
Computer-Controlled Bed (horizontal and vertical)	Dynamic Framing (variable from 1msec to static)
Data Acquisition Software: microPETManager™	Simultaneous Respiratory and Cardiac Gating
Data Analysis Tool: ASIPro™ (unlimited number of seats)	Interchangeable bed pallet
Attenuation Correction (both measured and calculated)	Mobile (does not require new setup)
Post Emission Transmission	Wholebody mouse imaging in a single bed position

* With lead shields removed.

** Measured with the energy window at 250 to 750 keV and with a 10 ns timing window, +/- 0.2

† For more details, see enclosed CD "microPET® specifications"

microPET[®] Engineering Specifications

Structural

Unit weight	Approx. 600 lbs. (272 kg)
Unit height	58 in. (1473.2 mm)
Unit width (including handles)	47 in. (1193.8 mm)
Unit depth (without bed)	27.5 in. (698.5 mm)
Bed extension	19 in. (482.6 mm)

Note: Additional space is necessary for placement of the PC.

Temperature and Humidity

Operating room temperature	70° F (21° C) or below
Operating humidity	30–70% non-condensing

Note: The maximum power consumption of the microPET[®] system is 2 kW (equivalent to 6800 Btu/hr). The actual system consumption can be significantly less during normal operations.

Electrical Requirements

microPET [®] tomograph	110V/20A isolated outlet (requires a 20A outlet for use with a 20A power connection) 240V/10A isolated outlet (Europe)
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Note: The appropriate power connection will be provided for each individual country.

Computer

PC electrical requirements	Standard 110V (220V) outlet
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Magnetic Field Restrictions

The magnetic field strength must be less than 10 Gauss.

Additional Equipment Required

Ge-68 point source (0.5 mCi)
