

# PET/MR 3T

- Crystal Clear Images, Unprecedented Accuracy

# MRI and PET Combined... For The Best of Both Worlds

The latest breakthrough in PET detector technology, together with the proven superior soft tissue contrast of translational field strength MRI, are now combined in one compact, easy to use instrument. Featuring homogeneous, constant PET resolution over the whole field of view, a newly developed 3T cryogen-free magnet and a motorized animal transport system, the PET/MR 3T simplifies your workflow and supports a broad spectrum of application fields, such as oncology, functional and anatomical neuroimaging, orthopedics, cardiac imaging and stroke models.

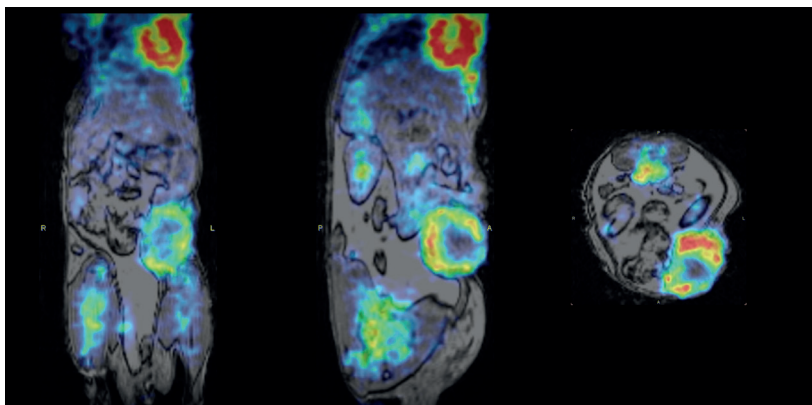
## Key Benefits

- Unprecedented PET resolution up to 0.7 mm, with Full Field Accuracy (FFA)<sup>1</sup>
- Save precious instrument time with a leading PET sensitivity of 12%
- Consistent quantification with attenuation correction based on high quality MRI data
- Unique boost of MRI sensitivity and resolution with the MRI CryoProbe™ for mice and rats
- Proven MRI performance with fully featured ParaVision® preclinical user interface, intrinsically supporting multimodal workflows

## Multimodal System Features

- Accurate animal positioning with the motorized animal handling system including touchscreen operation enables automatic co-registration of images
- Image fusion and quantitative analysis using PMOD
- Whole body scans with a total field of view of >285 mm enabled by moving table acquisitions

Figure 1



Mouse breast cancer model. 500,000 cells were subcutaneously inoculated in the mammary gland. Acquisition details: measurement time 10 minutes PET, 12 minutes MRI, 240  $\mu$ Ci FDG. Courtesy: Dr. Maria Jesus Vicent, Centro de Investigacion Principe Felipe, Valencia, Spain

## ● Next Generation MRI and PET Combined for Improved, Faster Research Results

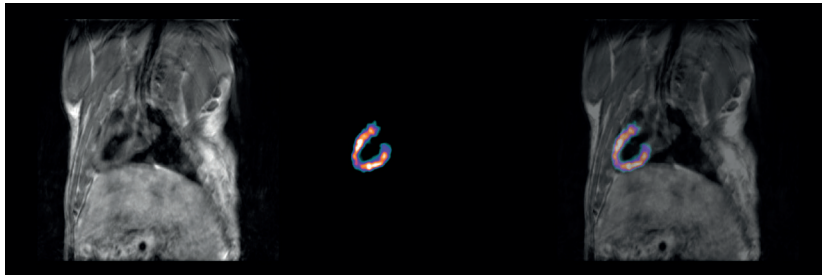
### PET Features

- Sharp PET images with new PET Silicon PM detectors deliver consistent and reproducible quantification within the entire FOV, regardless of object size and position
- Patented continuous LYSO crystals, unrestrained by discrete layers, and Silicon position sensitive photomultipliers with advanced depth-of-interaction (DOI) detection enable precise 3D localization of events. This eliminates the resolution degradation when moving out of the center of the PET Field-of-View (FOV)
- No shielding required: PET technology is fully compatible with high magnetic field strength; spatial resolution and energy resolution are unchanged within the magnetic field
- Exceptional count rate performance combined with 12% sensitivity for dynamic and gated studies for high temporal resolution and superior image quality

### MRI Features

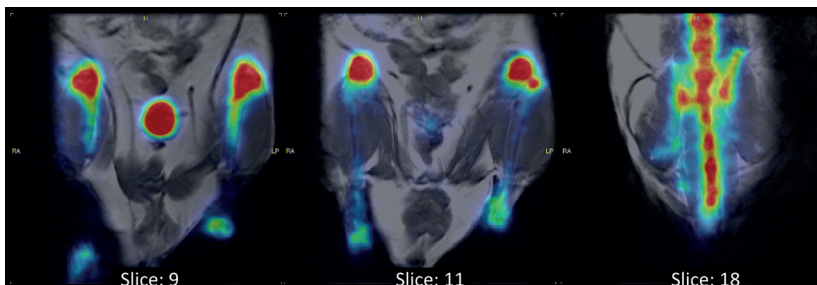
- Superior MRI magnet technology ensures the magnet remains on field during power outage or cold water failure for up to 4 hours
- Best in class homogeneity of  $\pm 0.1$  ppm for a 50 mm DSV due to solid magnet design
- MRI sequence portfolio of more than 1000 sequence variations, including wireless cardiac imaging using navigator based IntraGate methods with a choice of cartesian or radial readout, as well as short echo time imaging, such as UTE and ZTE
- Widest range of RF-coils (~30) for mice and rats available, including coils for head, brain, cardiac, body, and multi-purpose applications
- Over 100 validated and ready to use *in vivo* protocols and scan programs for mice and rats

Figure 2



Rat cardiac imaging, from left to right: MRI, PET, fused PET/MR image. Acquisition details: Scan time 10 minutes PET, 17 minutes MRI, 186  $\mu\text{Ci}$  FDG. Courtesy: Dr. Victoria Moreno, Centro de Investigacion Principe Felipe, Valencia, Spain

Figure 3



Mouse osteoarthritis knee model, from left to right: Knees, legs, and spine images. Acquisition details: scan time 10 minutes PET, 15 minutes MRI, 177  $\mu\text{Ci}$   $^{18}\text{F}$ -NaF. Courtesy: Dr. Victoria Moreno, Centro de Investigacion Principe Felipe, Valencia, Spain

### Technical Specifications for MRI

Field strength	3 Tesla (rampable)
Magnet technology	Cryogen-free magnet
Bore diameter	18 cm
Magnet hold-time during power outage or cold water failure	Up to 4 hours
Homogeneity	DSV 35 mm: $\pm 0.05$ ppm DSV 50 mm: $\pm 0.1$ ppm
Stray field (center to 0.5 mT)	0.53 / 0.88 m (radial / axial)
Quench pipe required	No

### Gradient Specifications

Inner diameter	105 mm
Gradient strength	450 mT/m (900 mT/m with high power option)
Slew rate	4200 T/m/s
Max. DC gradient	335 mT/m

### Technical Specifications for PET

FOV transaxial	80 mm
FOV axial	148 mm
FOV axial with moving table	>285 mm
Spatial Resolution @ Center of FOV	Up to 0.7 mm
Volumetric spatial resolution	< 1 mm
Sensitivity	12%
Average energy resolution	17%

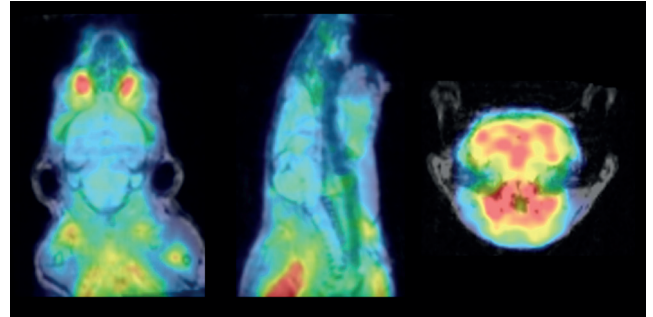
### NEMA Standards

NECR rat @ 10 Mbq	> 150 kcps
NECR rat @ 43 MBq	330 kcps
NECR mouse @ 3,7 Mbq	> 150 kcps
NECR mouse @ 35 MBq	560 kcps
Homogeneous resolution @ 80 mm FoV	$\leq 1.2$ mm
Sensitivity (energy window 50%)	9%

<sup>1</sup>Homogeneous resolution better than 1.2 mm in the whole 80 mm FoV, with 10 times bigger area of optimum detection

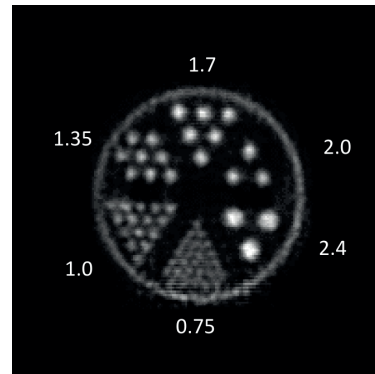
All MRI data are acquired at 1 Tesla

**Figure 4**



Mouse head PET/MR imaging. Acquisition details: scan time 20 minutes PET, 13 minutes MRI, 200  $\mu$ Ci FDG. Courtesy: Dr. Maria Jesus Vicent, Centro de Investigacion Principe Felipe, Valencia, Spain

**Figure 5**



PET image of a Derenzo phantom shows resolution of better than 0.75 mm.