

PET Insert

- From the Leader in PET Innovations

Trusted Preclinical MR Combines With Revolutionary PET Performance

The new PET Insert* for simultaneous high-field MR and PET imaging represents a culmination of Bruker Si detector innovations including unique continuous crystal technology with precise DOI detection, integration with SiPMs, and advanced electronics with full row and column readout. These innovations supply 0.7 mm resolution at Full Field Accuracy (FFA) and with 12% sensitivity that now extends to simultaneous PET/MR imaging with instruments up to 15.2 Tesla.

The PET insert is specifically designed for use with new and existing BioSpec high-field MR systems. This allows current BioSpec users to expand their system functionality to meet the growing demand for simultaneous PET/MR imaging in basic research and translational medicine. In the event that standalone PET imaging is desired, the insert can be easily retracted from the MR system and used at the Si-Connect Station provided.

PET Module

- Universal Si detector
- 0.7 mm resolution with FFA and 12% sensitivity
- Continuous crystals, full row and column readout, and DOI detection
- Silicon PMT design compatible with high-field MR
- Large FOV for whole body dynamic imaging

Compatibility

- BioSpec 70/30 USR, BioSpec 94/30 USR, and BioSpec 47/40 USR systems
- Inserted in less than 5 minutes
- Supplied with Si-Connect Station for standalone PET imaging and easy insertion into the magnet

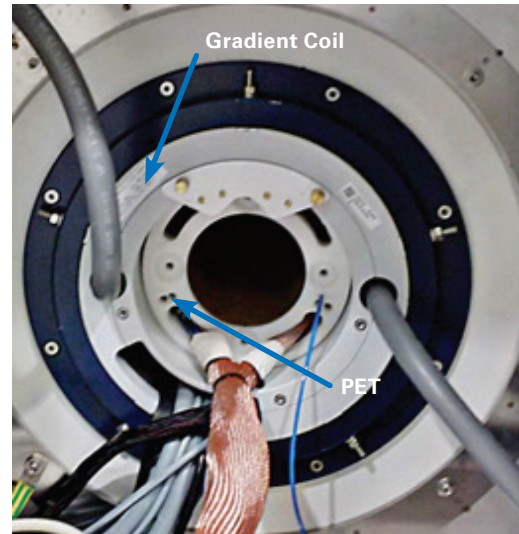


* Prototype

** Data Courtesy: Dr. Uwe Himmelreich, Dr. Willy Gsell, Dr. Cindy Casteels, Molecular Small Animal Imaging Center (MoSAIC), University hospital of Leuven, Belgium.

● Simultaneous PET/MRI

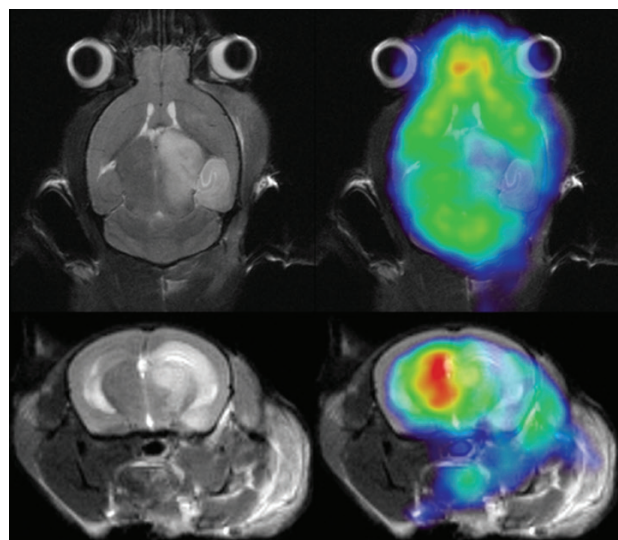
- Multi-parametric imaging
- Inherent coregistration of PET and MRI data in space and time for the study of dynamic processes
- Synchronized gating
- Highest possible throughput due to parallel use of both modalities
- Translational protocols
- Unparalleled soft-tissue contrast
- Reduced total imaging times mean less anesthetic stress and reduced mortality
- Better PET data through the use of MRI data-based motion correction
- Guide external interventions in real time



PET Insert shown in a BioSpec 70/30 USR installation

PET	Tracer Uptake	Static, Dynamic – with or without gating
MRI	Scout	T1, T2, DTI, other – with or without gating

Simultaneous PET/MR imaging offers maximum efficiency. The graph above shows options in basic simultaneous PET/MR scan workflows. Variations in workflow can also include synchronized scan times, & intra-scan injections of MR contrast agents or PET tracers.

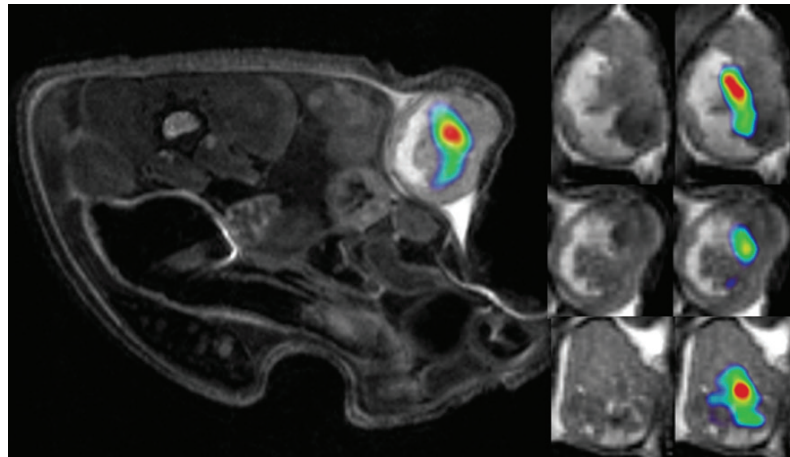


PET/MR Ischemic MCAO Mouse**

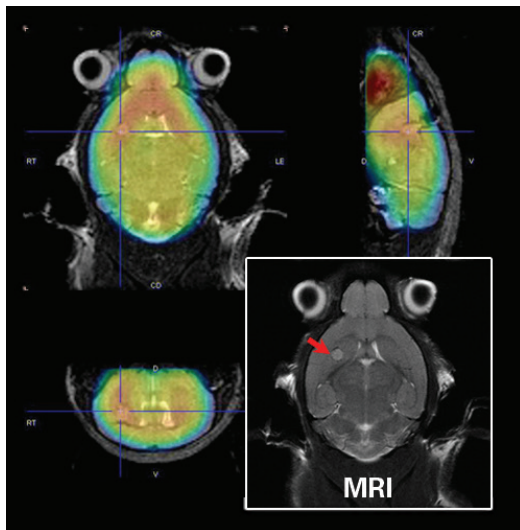
● Applications

The PET Insert SiM design allows users to follow already familiar Bruker BioSpec MR imaging system workflows to start obtaining valuable PET/MR data almost immediately. The first system was installed in August 2016 in a 7 Tesla system at The University of Leuven, Belgium under the guidance of Christophe Deroose, Ph.D., Professor of Nuclear Medicine. Their initial imaging highlights the value of simultaneous PET/MR in studies involving structure/function in both tumor gross anatomy and tumor micro-environment. The potential of multi-parametric analysis, as well as simultaneous brain and cardiac imaging are also demonstrated.

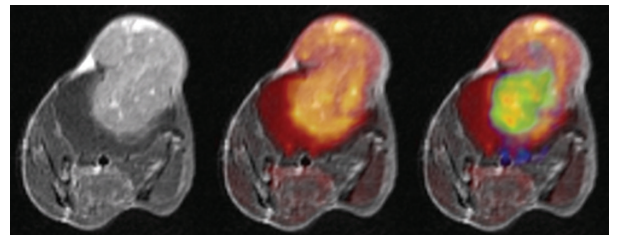
Tumor Imaging



Mouse subcutaneous xenograft (SKOV3) tumor model, imaged four weeks after engraftment. T1W-Flash and 18FDG/PET overlays. 3D-Turbo-RARE, resolution: $(234 \mu\text{m})^3$ isotropic; PET: 14.8 MBq 18FDG, scan performed 20 min post injection.**



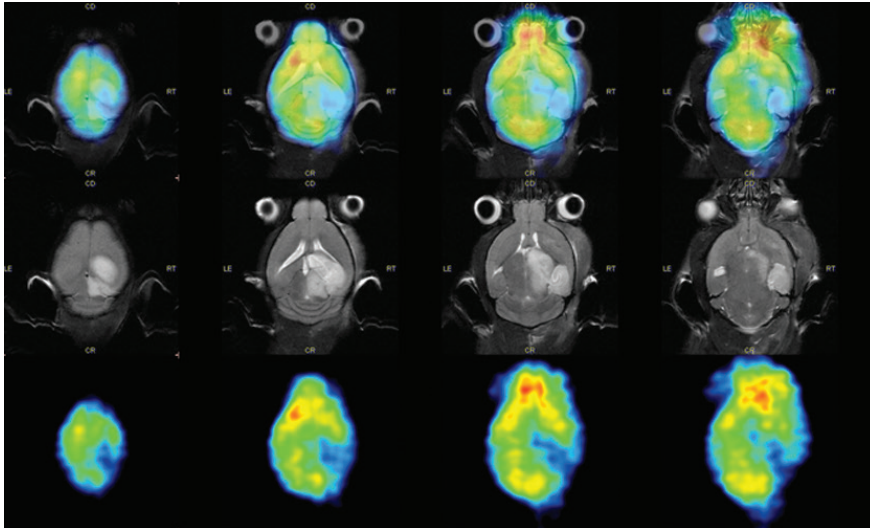
Early stage mouse glioma (CT-2A). Tumor volume extracted from MRI: $\sim 0.59 \text{ mm}^3$. Precise definition of the ROI based on high-field MRI allows PET tumor studies at the earliest stage. MRI: T2-Turbo-RARE, resolution: $(86 \times 86) \mu\text{m}^2$; PET: 16.6 MBq 18FDG, scan 20 min post injection.**



End stage orthotopic glioma (CT-2A). Triple-overlay of 18FDG/PET (Rainbow), Diffusion weighted (Fire) and RARE (Gray) MRI with precise inherent co-registration. DWI shows heterogeneity in the tumor corresponding to regions with low diffusion suggesting loci of high cellular division. MRI: T1-RARE, resolution: $(195 \times 195) \mu\text{m}^2$, scan time: 1 min 17 s, DTI_SE, scan time: 10 min 40 s, 5 b-values: 5-1000 s/mm^2 ; PET: 10.4 MBq 18FDG, scan 2 hrs after injection. The total time required for these images is only 12 minutes**

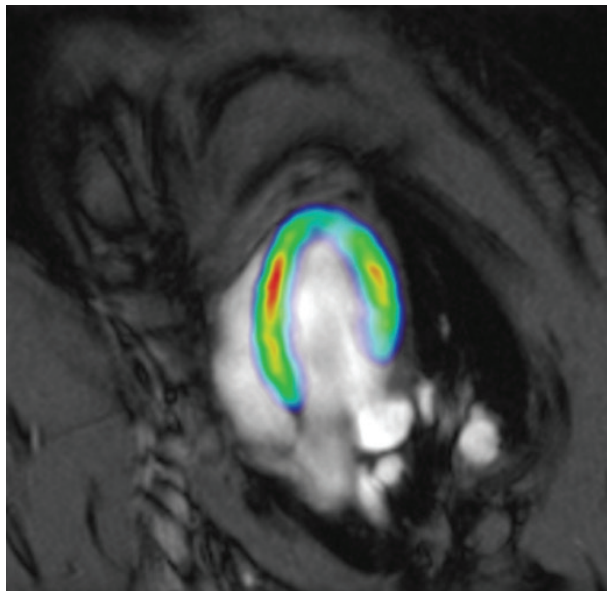
● Applications

Neuro-imaging



Ischemic MCAO mouse model (intraluminal transient MCAO, 24hrs post occlusion/ reperfusion). High resolution MRI enables the location of the lesion including the vasogenic edema corresponding to the low 18FDG uptake (lesion core). Acquisition details: MRI: Turbo-RARE, resolution: (86 x 86) μm^2 PET: 13:6 MBq 18FDG, scan performed 20 min post injection.**

Cardiac Imaging



Dynamic cardiac imaging allows full cardiac functional assessment. Unique wireless self-gated IntraGate cardiac Cine image and PET overlay. MRI: IntraGateFLASH, Cine frames: 10; PET: 27 MBq 18FDG, scan performed 20 min post injection.**

Enhancing research capabilities and accelerating time-to-market of drugs

- Knowledge and expertise of a global market leader in imaging technologies
- An unmatched portfolio of nine preclinical imaging modalities
- All modalities can be used singly or in combination with each other
- Advanced, proven imaging technologies from a single source
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- A broad spectrum of industry, application and research tasks covered
- Service throughout the whole lifecycle of instruments and solutions
- Protection of investments in instruments and solutions
- A company managed by scientists, understanding the needs of scientists



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