

Simultaneous 9.4 T FDG PET/MR in mouse brain
MR morphology and PMOD/PFUS functionality used for precise registration to brain atlas
Courtesy: J. Kim, PhD, Department of Radiology and Imaging Sciences, Indiana University.

Simultaneous PET/MR

- 4D Correlation of Functional Molecular and Multi-parametric Imaging

Highest Sensitivity and Specificity of PET meets Unlimited Possibilities of Multi-parametric MRI

Simultaneous PET/MR spatially and temporally correlates the observation of metabolic, physiological and functional processes using two powerful yet complementary molecular imaging techniques.

In this way, simultaneous hybrid imaging is a unique tool to probe biological and disease mechanisms. PET/MR has an impact in all areas of molecular and medical research, such as oncology, neuroscience, infectious diseases, cardiology, theranostics, immunology and tracer development.

Key Benefits

- Highest functional molecular imaging sensitivity through total body PET
- Multi-parametric MRI and MRS for physiological, functional and morphological characterization of molecular processes
- Self-gated IntraGate® PET/MR cardiac PET and MR imaging without ECG or respiration sensors
- Accurate and precise PET quantification incorporating MR attenuation correction and MR based VOI segmentation
- Increased throughput by simultaneous use of measurement time and multi-mouse PET and MR imaging

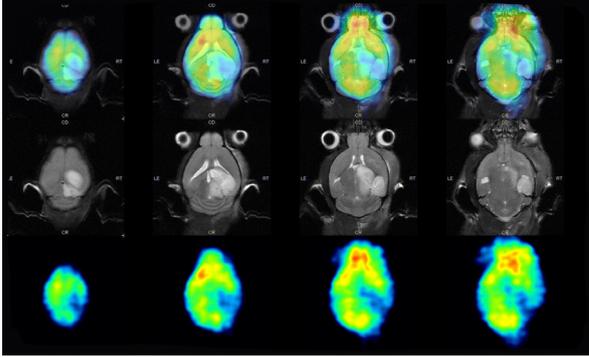
ParaVision 360 π.pmod



● Applications

Multiparametric Stroke Imaging

Ischemic MCAO mouse model, 24 h post occlusion / reperfusion

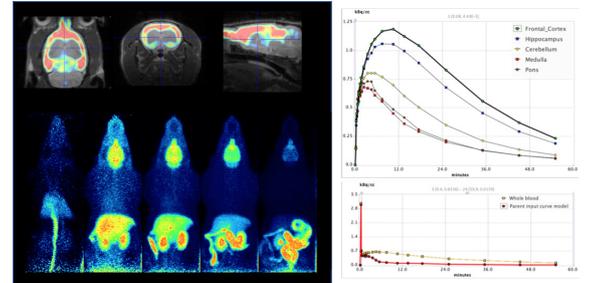


High resolution MR enables precise location of the lesion including the vasogenic edema corresponding to the low FDG uptake at the core of the lesion.

Courtesy: Prof. U. Himmelreich, Dr. W. Gsell, Dr. C. Casteels, KU Leuven

Dynamic Brain Imaging in Rats

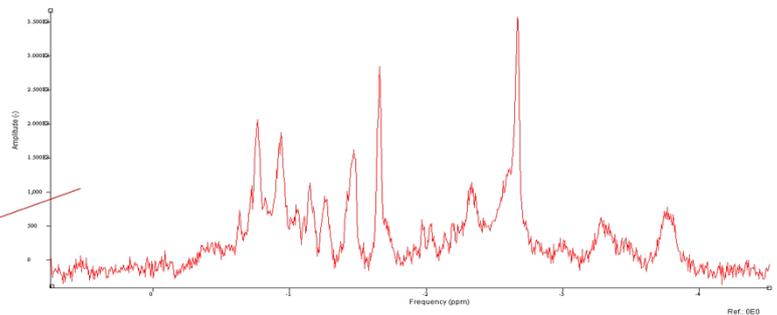
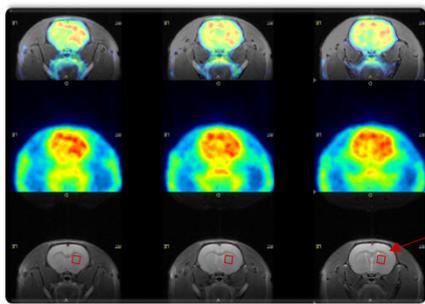
C-11 Flumazenil



High performance PET with time frames < 5 s allows fast imaging with short half-life tracers such as ^{11}C -flumazenil. The large FOV makes the vena cava accessible as a surrogate input function. Time-activity curves can be extracted from the brain using built-in atlases in PMOD. Kinetic modelling is used for full quantitation of receptor binding using PKIN.

Courtesy: Dr. W. Gsell, Dr C Cawthorne, Prof. C. Deroose, Prof. U. Himmelreich, KU Leuven

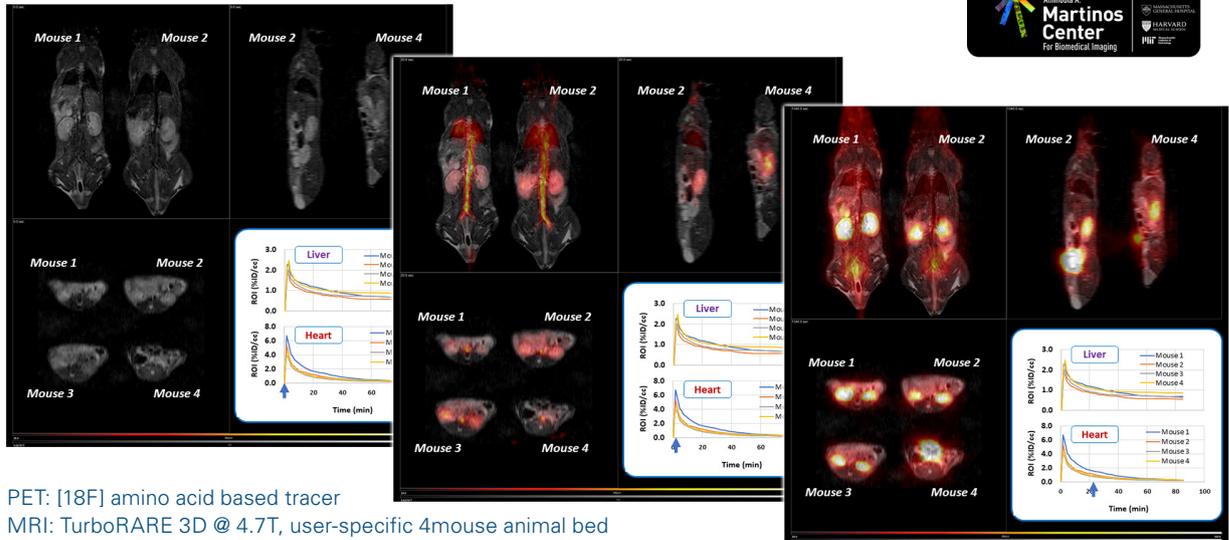
Metabolic Response in Addiction Model



FDG PET/MRS was simultaneously performed during cocaine infusion on rats. ^1H -MRS provides a dynamic estimate of the concentration of glutamate and other metabolites during uptake. FDG PET provides a complimentary measure of neuronal activity.

Courtesy: Dr B. de Laart, Dr W. Gsell and Prof U. Himmelreich, KU Leuven

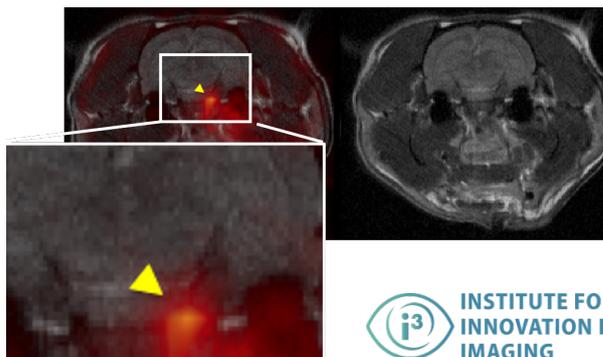
Simultaneous multi-mouse PET/MR uptake study of new tracer



PET: [18F] amino acid based tracer
 MRI: TurboRARE 3D @ 4.7T, user-specific 4mouse animal bed

Courtesy: I. Y Zhou et al. Peter Caravan Laboratory. High-Throughput Total Body Dynamic Imaging in a Preclinical PET/MRI 4.7T System. The Athinoula A. Martinos Center for Biomedical Imaging, MGH and Harvard Medical School. SNMMI 2020 Poster

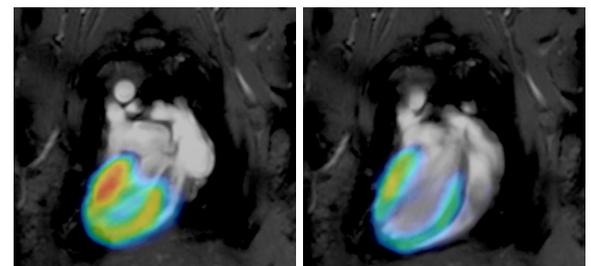
Simultaneous PET/MR in Rat Ischemic Stroke Model



Novel fibrin-specific molecular probes to detect thrombus may be useful in disease detection and treatment response. They can be tested in stroke models. Simultaneous PET/MR provides perfect anatomical registration and contrast for the vasculature. Occlusive thrombus in the internal carotid artery (arrowhead) shows high uptake of a fibrin-specific tracer.

Courtesy: Ni. Rotile, Dr. I. Ay, Dr. C. Farrar, Dr. P. Caravan, Institute for Innovation in Imaging and Martinos Center at Massachusetts General Hospital.

IntraGate PET/MR® for self-gated Cardiac PET/MR



Faster and easier animal preparation.
 Sharp PET images even in unstable or arrhythmic models
 Enables unique applications where ECG setup is not possible.

Courtesy: Dr. W. Gsell, Prof. C. Deroose, Prof. U. Himmelreich, KU Leuven

Simultaneous PET/MR Product Overview

Both PET Inserts are based on the Bruker Si PET imaging platform that is designed for highest sensitivity, Full Field-of-View Accuracy without degradation of spatial resolution & quantification accuracy across the entire FOV, highest count rates and full MRI compatibility.

PET Insert Si 198:

Total body PET of mice and rats

- Up to 0.7 mm spatial resolution
- 12 % sensitivity
- 150 x 80 mm FOV

Compatible with BioSpec 30 cm

PET Insert Si 103:

Total body PET of mice and rat head applications

- Up to 0.7 mm spatial resolution
- 11 % sensitivity
- 100 x 40 mm FOV

Compatible with BioSpec 3T

Compatible with BioSpec 20 and 30 cm



Bruker offers a range of PET optimized RF coils, dedicated PET/MR compatible animal beds and a MR based attenuation correction method for accurate PET quantification.

Bruker has a long history of innovation and excellence in imaging systems as a result of placing the customer at the center of all activities. This philosophy and commitment to provide customers with unparalleled help throughout the buying cycle, from initial inquiry to evaluation, installation, and the lifetime of the instrument is now characterized by the LabScape service concept.

LabScape Maintenance Agreements, On-Site On-Demand and Enhance Your Lab are designed to offer a new approach to maintenance and service for the modern laboratory.



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