with hybrid PET/MRI. 


**EP-0180**  
Feasibility of Multi-Week PET Studies with a Single Injection of $^{89}$Zr-phosphate on a Clinical PET/MRI  

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Aim: $^{89}$Zr-labelled $p$-isothiocyanato-desferrioxamine ($^{89}$Zr-DBN) is a promising new cell labelling agent that has the potential to label and track a variety of cells over multiple days (Bansal et al. EJNMMI Res (2015) 5:19). In order to better understand the inflammatory process after myocardial infarction, we are developing methods to track $^{89}$Zr-DBN labeled monocytes over multiple weeks. The aim of this study was to assess the feasibility of multi-week $^{89}$Zr studies on a clinical PET/MRI using a single injection of $^{89}$Zr-phosphate, measuring the uptake and longevity of the tracer in target organs.

**Subject & Methods:**
A 24.5 kg bred-for-research hound was injected intravenously with 80 MBq of $^{89}$Zr-phosphate (3D Imaging LLC). Whole-body PET/MRI (Siemens Biograph mMR) was acquired under anesthetized at 3 hours and 4, 8, 12, and 16 days after injection. Acquisitions consisted of 5-6 bed positions (20 cm each), with 15-30 minutes/bed position. After 20 days, a head and neck PET/MRI acquisition (45 minutes/bed position) preceded measurement with a whole body shadow shield gamma detector. Regions of interest included whole-body, lungs, liver, kidneys and bone (vertebrae, sacrum, sternum, ribs, scalpula) and were defined using a threshold in the PET image with additional reference to anatomy in the MRI (3D Slicer). All experiments were approved by the local animal care committee.

**Results:** At 3 hours, 97% of the injected dose (ID) was measured in the whole-body scan, with activity concentrated in the lungs, liver, and blood. Whole-body activity decreased to 73% ID by day 4 and stayed relatively stable thereafter: (71 ± 2)% ID when averaged over days 8-16. Uptake in different regions was also stable by day 8, with SUV = 3.3 ± 0.2 (liver), 3.2 ± 0.3 (lungs), and 10.6 ± 1.5 (bone) when averaged over days 8-16. After 20 days, whole-body activity was approximately 1 MBq, yet bones in the head and neck were still clearly visible.

**Conclusion:** Longitudinal studies with $^{89}$Zr benefit from a long half-life (78.4 hours) but are limited by lower injected dose and less PET-visible activity. With its increased sensitivity and additional anatomical information, the mMR is well-suited to long-term $^{89}$Zr studies. With a branching ratio of 0.2275, 1 MBq $^{89}$Zr is equivalent to a PET scan of 0.24 MBq $^{18}$F. Despite this ultra-low dose, we were still able to delineate bones in the head and neck at day 20, demonstrating the feasibility of multi-week PET studies using $^{89}$Zr-labelled cells.

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PET/MRI technique role in Alzheimer disease

**EP-0182**  
Effect of attenuation and its correction in brain PET/MR imaging: a phantom study