CBNS Animal Imaging Workshop
Advanced Stream: Practical Session

The Advanced Stream will be divided into two parts: image acquisition and image processing. During the morning session, you will participate in 3 key experiments that highlight the types of data you can acquire from three pairings of in vivo modalities: PET-MRI, PET-CT, and Optical/MSOT. In the afternoon, you will take the data you have obtained (or analogous data) and learn about the capabilities of both the commercial and open-source image processing applications and the techniques that can be used.

– PET-MRI –

BIODISTRIBUTION AND PHARMACOKINETICS OF ^{18}FDG AND GADOVIST®

Experimental Description:	^{18}FDG & Gadovist® will be co-injected and the biodistribution will be monitored using PET and MRI over a short time. A variety of MRI acquisitions will be taken and the types of tissue contrast you can see and information you can obtain with and without contrast agents will be explored.
Key Questions	• Which tracer is better for pharmacokinetic analysis? • What kinds of information can you obtain from the different MRI sequences? • Why use PET if Gadovist® can give pharmacokinetic information?
Image Processing	• Benefits and issues of co-registration • Kinetic Analysis • Anatomical features of PET-MR

Notes:

– PET-CT –

High Throughput Biodistribution of ^{18}FDG in Mice

Experimental Description:	^{18}FDG will be injected into 2 mice and the biodistribution measured via one scan over 30 minutes. The mice will then be euthanised, their organs harvested, and the radiation counted using a gamma counter.
Key Questions	• How does this biodistribution data compare with the dynamic PET from the first experiment? • What are the differences in CT/MRI as anatomical references? • How does the ex vivo data compare with the in vivo data?
Image Processing	• Compare anatomical resolution with MRI • ROI drawing – how accurate do you need to be? • Correlation between in vivo and ex vivo data.

Notes:

THE UNIVERSITY OF QUEENSLAND
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CENTRE FOR ADVANCED IMAGING

ARC Centre of Excellence in CONVERGENT BIO-NANO SCIENCE & TECHNOLOGY

– OPTICAL / MSOT –

MODALITY COMPARISON OF BIODISTRIBUTION & NANOPARTICLE ACCUMULATION IN A XENOGRAFT TUMOUR MODEL

Experimental Description:	One mouse with a xenograft tumour that has been injected with an antibody targeted nanoparticle will be imaged using fluorescence optical imaging. The anatomical resolution and data obtained from both optical and MSOT techniques will be examined. The tumour bearing mouse will be dissected post-mortem and the organs imaged.
Key Questions	• What are the key benefits of using optical and MSOT over PET? • What are the advantages and disadvantages of in vivo imaging in optical and MSOT imaging techniques? • Are either technique quantifiable in vivo?
Image Processing	• In vivo and ex vivo image processing comparison • Pretty pictures vs data • Compare image processing techniques across all platforms • Open source options for images – ImageJ, etc.

Notes: