# PRECLINICAL PET/CT

Preclinical Positron Emission Tomography/Computed Tomography (PET/CT) is a key non-invasive imaging tool used for studying disease development and progression as well as for the development of novel radiotracers and pharmaceuticals. It supports the investigations and evaluations of underlying biological mechanisms, the physiological processes in healthy or diseased models.

Using target specific positron emitting radiotracers in conjunction with x-ray, PET/CT allows for the acquisition of anatomical and functional information in one imaging data set. Figure 1 shows a PET/CT rodent acquisition, displaying the CT, PET and fused PET/CT image.

A   B   C
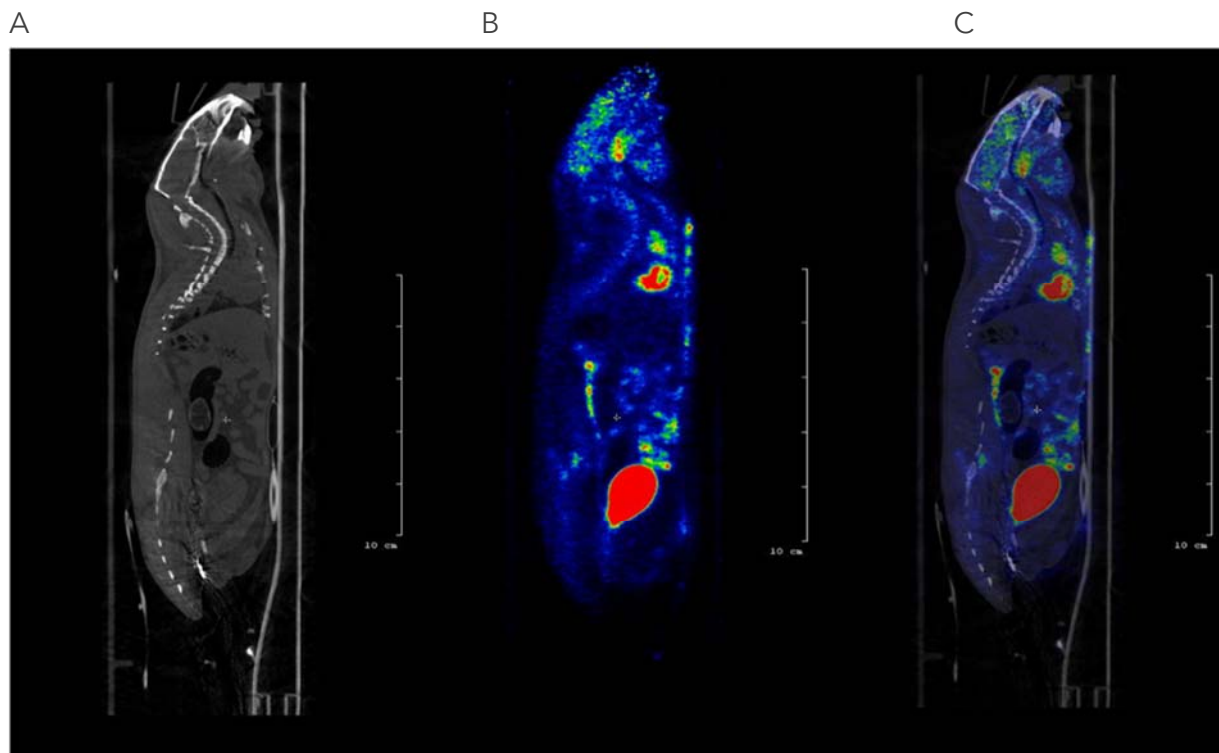
Figure 1: PET/CT sequence of images (CT, PET and PET/CT).
Panel (A) displays the CT (X-ray -anatomical information.
Panel (B) shows the PET image (functional information).
Panel (C) displays the PET/CT fused imaged.

Currently, different routine PET image reconstruction methods are used amongst preclinical research sites. For example, sites will use filter backproject (FBP) and/or ordered subset expectation maximization (OSEM) or maximum likelihood expectation maximization (MLEM) with dissimilar numbers of iterations/subsets.

The use of different reconstruction methods has been shown to produced substantial variations in quantitative data analysis (uniformity, recovery coefficients and standard uptake values). Therefore, standardisation of PET primarily involves establishing global reconstruction guidelines. This will provide improved quantitative precision and accuracy across all imaging data sets. Thus, more robust and reproducible results will be generated irrespective of scanner characteristics.

An additional focus for PET standardisation is the establishment and implementation of regular scanner calibration guidelines and requirements.

References

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