Report for Exchange programme at UCL

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Summary

The purpose of the exchange programme was to process and reconstruct list-mode data acquired from the Siemens PET-MR scanner as processing data from a PET-MR scanner is not straightforward, generally due to the incompatibility between the format of the scanner and the user software. In addition, Reconstruction taking into account attenuation, normalisation, random and scatter effects is an essential step. During the visit to UCL the main achievements were: that all necessary datasets are now readable; a script now exists for different reconstruction algorithms; and that reconstructions were successfully performed creating a range of images. We plan to make this script available to other users of the Siemens PET-MR scanner.

1 Activities

The activities during the programme have been:

- Re-organization of the UCL scripts;
- Learnt how to perform:

- Attenuation correction;
- Scatter and Random evaluation;
- Normalisation correction.

2 Key output

A script to reconstruct PET-MR data mostly based on the open source STIR is now available for the users.

3 Description

Depending on whether or not people use the scanner software they can have two possible formats:

- IMA: is the format obtained using the scanner tools, it is a DICOM file which contains both data and header;

- DCM+BF: is the raw format which is the output from the scanner, it consist of the DICOM header plus a binary file;

The script used at UCL reads IMA files to extract a STIR header and goes over all the step in the reconstruction procedure:

- Unlisting (the LM data is converted into a sinogram);

- Attenuation correction;

- Normalisation correction;

- Random and scatter evaluation;

- Reconstruction with OSEM algorithm and Gaussian smoothing.

The data provided was a DCM+BF format, as a consequence the script has been modified in order to read and reconstruct this format. In addition, the new version of the script uses MATLAB only as an interface, as all the steps previously described are now STIR-based.

4 Sources of non-CCP PETMR significant sponsorship