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## **(POS-33 Withdrawn) Back projection of image reconstruction**

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**Introduction** Positron Emission Tomography (PET) uses radiotracers to visualize the function of the body. The radioactive atom, which is part of the radiotracer, decays through positive beta decay and releases two 511 keV photons in opposite directions. The photons are used to map the location of radiotracers. PET can be used to locate malignant tumours, and for understanding strokes, dementia, among other diseases and disorders. An anatomical imaging method is needed in addition to PET so the functional maps can be overlaid on the anatomy. Traditionally the anatomical imaging method has been CT. More recently MRI has been proposed because it has some advantages over CT as the supplemental method to PET. Aspects of image processing need developing for PET-MR. Preliminary steps in image processing will be shown.

**Methods** As a first step to understanding the field of image reconstruction, a Matlab program was used which generates CT projections from simulated data and then performs back projection to reconstruct the image. Parameters which were varied during the generation of CT projections include: the angle over which reconstruction is made, and the number of projections. Image matrix size was varied during the back projection.

**Results** Changes to the basic imaging and reconstruction parameters cause significant changes to the quality of the resulting image. Specifically, image resolution, image contrast, and presence of artifacts vary with image and reconstruction parameters. As expected, simple back projection does not provide high quality images.

**Conclusion** With the understanding of simple back projection and the role imaging and reconstruction parameters play, study can continue into PET image reconstruction, and more complex reconstruction methods, such as OSEM. This will lead to the start of more complex image reconstruction for PET/MR data with the goal of increasing the use of clinical PET/MRI.

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**Reference** Shrinivas (2025). Reconstruction of Image from Simple Back Projection (<https://www.mathworks.com/matlabcentral/fileexchange/reconstruction-of-image-from-simple-back-projection>), MATLAB Central File Exchange. Retrieved April 14, 2025.

### **Keyword-1**

PET imaging

### **Keyword-2**

Image reconstruction

### **Keyword-3**

Neuroscience

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