SPM ANALYSIS OF FDG RAT PET SCANS

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Statistical Parametric Mapping (SPM) is a method for analyzing inter-subject functional neuroimages without requiring segmentation of a-priori determined regions of interest (ROIs). This methodology has been widely validated and employed in human neuroimaging.

In experimental PET imaging studies in small animals (rats, mice, etc.), regions that will present effects of interest are often not known in advance Accordingly, a tool that permits the analysis of functional scans without requiring the determination of ROIs before conducting the experiment would be of great value.

The use of human-oriented SPM software packages in small animal PET studies, however, has not been validated. The main difficulty arises from the need to spatially normalize the different subjects in the study to allow for a voxel-by-voxel analysis. This procedure requires a template scan to set up the reference space to which all the individual scans will be normalized. An elastic deformation involving hundreds of parameters is necessary when normalizing human brains. On the other hand, complexity and anatomical variability of rat brains in animals of similar size and weight, are potentially much lower than in human subjects. A reduction in the number of parameters involved in the spatial normalization might result in a more robust normalization procedure.

In this work, we created a template for small imaging PET studies by performing a number of paired 18F-FDG PET and MRI scans to assess the optimum number of parameters required for spatial normalization. We present the results of an SPM analysis of rat PET scans using this technique.