

A visualization method of the PET brain functional image for clinical application

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Abstract

The role of the PET (positron emission computed tomography) has become more and more important for patients and nuclear researchers to obtain useful information. In the field of brain functional imaging, the PET images of CBF (cerebral blood flow), OEF (oxygen extraction fraction) and CMRO₂ (cerebral metabolic rate of oxygen) are quite valued. However as the PET images are not good anatomically, they often need to be registered with the ones from other imaging modalities, such as MR (magnetic resonance) and CT (computed tomography). Another problem is that PET CBF image cannot be directly registered with the other two (OEF and CMRO₂) images for some technical reasons. The purpose of this work is to establish a method of simultaneous displaying of the integrated PET image of the above three brain functions. The work was proceeded through three steps; normalization, simplification and integration of the three functional images. For normalization, the CBF images of normal volunteers are integrated with their OEF and CMRO₂ images by statistical processing and the accuracy of the integrated image was examined. 536 ROIs (regions of interest) are settled on the image using the 3DSRT software and the normal value for each ROI was determined by statistically analyzing the collected data of normal volunteers. To simplify the display of the integrated image, the parts whose data are within mean \pm 2SD of the normal are processed not to be discriminated. Although the integrated image has yet been improved for practical application, it has enabled simultaneous diagnosis of CBF, OEF and CMRO₂.