

## Summary

### Quantitative Estimation of Brain Atrophy and Function with PET and MRI Two-Dimensional Projection Images

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**[Purpose]** The purpose of this paper is to estimate the extent of atrophy and the decline in brain function objectively and quantitatively.

**[Methods]** Two-dimensional (2D) projection images of three-dimensional (3D) transaxial images of positron emission tomography (PET) and magnetic resonance imaging (MRI) were made by means of the Mollweide method which keeps the area of the brain surface. A correlation image was generated between 2D projection images of MRI and cerebral blood flow (CBF) or <sup>18</sup>F-fluorodeoxyglucose (FDG) PET images and the sulcus was extracted from the correlation image clustered by K-means method. Furthermore, the extent of atrophy was evaluated from the extracted sulcus on 2D-projection MRI and the cerebral cortical function such as blood flow or glucose metabolic rate was assessed in the cortex excluding sulcus on 2D-projection PET image, and then the relationship between the cerebral atrophy and function was evaluated.

This method was applied to the two groups, the young and the aged normal subjects, and the relationship between the age and the rate of atrophy or the cerebral blood flow was investigated. This method was also applied to FDG-PET and MRI studies in the normal controls and in patients with corticobasal degeneration.

**[Results]** The mean rate of atrophy in the aged group was found to be higher than that in the young. The mean value and the variance of the cerebral blood flow for the young are greater than those of the aged.

The sulci were similarly extracted using either CBF or FDG PET images.

**[Conclusions]** The proposed method using 2-D projection images of MRI and PET is clinically useful for quantitative assessment of atrophic change and functional disorder of cerebral cortex.

**Key words:** Brain atrophy, Two dimensional projection image, K-means clustering, Cerebral blood flow, Glucose metabolism.