

## Three-dimensional registration of myocardial perfusion SPECT and CT coronary angiography

Hidenobu NAKAJO, Shin-ichiro KUMITA, Keiichi CHO and Tatsuo KUMAZAKI

*Department of Radiology, Center for Advanced Medical Technology, Nippon Medical School*

**Objective:** In this study, we describe a new technique for three-dimensional registration of CT coronary angiography (CTCA) and gated myocardial perfusion SPECT. **Methods:** Twelve patients with known or suspected CAD who underwent CTCA and gated SPECT were enrolled retrospectively. Coronary arteries and their branches were traced using CTCA data manually and reconstructed in three-dimensions. Gated SPECT data were registered and mapped to a left ventricle binary model extracted from CTCA data using manual, rigid and nonrigid registration methods. **Results:** Three-dimensional reconstruction and volume visualization of both modalities were successfully achieved for all patients. All 3 registration methods gave better quality based on visual inspection, and nonrigid registration gave significantly better results than the other registration methods ( $p < 0.05$ ). The cost function for three-dimensional registration using nonrigid registration ( $235.3 \pm 13.9$ ) was significantly better than those of manual and rigid registration ( $218.5 \pm 15.3$  and  $223.7 \pm 17.0$ , respectively). Inter-observer reproducibility error was within acceptable limits for all methods, and there were no significant difference among the methods. **Conclusion:** This technique of image registration may assist the integration of information from gated SPECT and CTCA, and may have clinical application for the diagnosis of ischemic heart disease.

**Key words:** single photon emission computed tomography, three-dimensional registration, computed tomographic coronary angiography