

## Diagnostic accuracy of simultaneous acquisition of transmission and emission data with technetium-99m transmission source on thallium-201 myocardial SPECT

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**Purpose:** This study evaluates not only the clinical usefulness but also the problems in attenuation correction for thallium-201 (Tl-201) myocardial SPECT by means of simultaneous transmission and emission data acquisition in the detection of coronary artery disease (CAD).

**Methods:** A three-detector SPECT system equipped with a Tc-99m line source and fan-beam collimators was used for simultaneous transmission and emission data acquisition for Tl-201 myocardial SPECT in 73 patients (18 patients for normal database and 55 patients for the evaluation of diagnostic accuracy). Attenuation-corrected (AC) images and non-attenuation-corrected (NC) images were reconstructed with an iterative maximum-likelihood estimation-corrected (ML-EM) algorithm. Both sets of images were reoriented into the short axis. Normal database polar maps were constructed from the AC and NC images for quantitative analysis.

**Results:** There was a significant difference in specificity between NC and AC images in the RCA territory and those in specificity and accuracy in the LCX territory. There was no significant difference in sensitivity found between NC and AC images in either territory, but sensitivity in both territories tended to decrease with attenuation correction. In the LAD territory, there were various changes in sensitivity and specificity observed with attenuation correction in cases with each quantitative criterion.

**Conclusions:** Diagnostic performance of significant stenosis in the RCA and LCX territories quantitatively improved with attenuation correction because of an increase in specificity, but no significant improvement in diagnostic performance was obtained in the LAD territory with attenuation correction. We recommend combined interpretation of AC and NC images and careful evaluation of any SPECT image by means of transmission computed tomography.

**Key words:** transmission computed tomography, attenuation correction, Thallium-201 myocardial SPECT, coronary artery disease