Annals of Nuclear Medicine Vol. 6, No. 3, 153–158, 1992

Correction of scattered photons in Tc-99m imaging by means of a photopeak dual-energy window acquisition

Akihiro KOJIMA,* Akinori TSUJI,* Yoshikazu TAKAKI,* Seiji TOMIGUCHI,* Masafumi HARA,* Masanori MATSUMOTO** and MUTSUMASA TAKAHASHI*

**Department of Radiology, Kumamoto University School of Medicine*
***Department of Radiological Technology, College of Medical Science, Kumamoto University*

We are proposing a new method for correcting of scattered photons in technetium-99m (^{99m}Tc) imaging by means of photopeak dual-energy window acquisition. This method consists of the simultaneous acquisition of two images and estimation of a scatter image included in the symmetric energy window (SW) image by the difference between these images. The scatter corrected image is obtained by subtracting the scatter image from the SW image. In order to evaluate this method, we imaged a planar and a SPECT phantom with cold lesions and calculated the contrast value with and without the scatter correction. In addition, we performed asymmetric energy window (ASW) imaging to compare with this scatter correction method for planar images. In the planar image with the tissue-equivalent material of 10 cm, the scatter correction method removed 32% of the counting rate of the SW image and improved from 0.81 to 0.94 of the contrast value for a 4 cm-diameter cold lesion, while the contrast value with the ASW was 0.87 for such a cold lesion. The scatter corrected SPECT image had a reduction of 18% of the counting rate of the SW SPECT image and improvement of ~11% in contrast for cold spot sizes larger than a 3 cm-diameter, compared with the SW SPECT image. In addition, a perfusion defect could be well visualized by this scatter correction method on ^{99m}Tc-HMPAO regional cerebral blood flow SPECT of a patient. Our proposed scatter correction method can improve both planar and SPECT images qualitatively and quantitatively.

Key words: Compton scatter correction, photopeak dual-energy window acquisition, scatter image