ORIGINAL ARTICLE

Annals of Nuclear Medicine Vol. 21, No. 1, 25–32, 2007

Scatter correction based on an artificial neural network for ^{99m}Tc and ^{123}I dual-isotope SPECT in myocardial and brain imaging

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The aim of this study was to elucidate the clinical usefulness of scatter correction with an artificial neural network (ANN) in ^{99m}Tc and ^{123}I dual-isotope SPECT. ***Methods:*** Two algorithms for ANN scatter correction were tested: ANN-10 and ANN-3 employing 10 and 3 energy windows for data acquisition, respectively. Three patients underwent myocardial or brain SPECT with one of the following combinations of radiopharmaceuticals administered: ^{99m}Tc-tetrofosmin and ^{123}I-metaiodobenzylguanidine (MIBG), ^{99m}Tc-methoxyisobutylisonitrile (MIBI) and ^{123}I-beta-methyl-paraiodophenyl-pentadecanoic acid (BMIPP), or ^{99m}Tc-ethyl-cistainate dimmer (ECD) and ^{123}I-iomazenil. The patients were also referred for single-isotope imaging incorporating conventional triple-energy window (TEW) scatter correction. Crosstalk- and scatter-corrected ^{99m}Tc- and ^{123}I-SPECT images in dual-isotope acquisition with ANN were compared with those in single-isotope acquisition. ***Results:*** The ANN method well separated ^{123}I and ^{99m}Tc primary photons. Although ANN-10 yielded images of poor quality, ANN-3 offered comparable image quality with the single-isotope scan without significant increase of acquisition time. ***Conclusion:*** The proposed method is clinically useful because it provides various combinations of information without anatomical misregistration with one acquisition.

Key words: artificial neural network, dual-isotope SPECT, scatter correction, brain SPECT, myocardial SPECT