عنوان مقاله:

Determination of the Energy Windows for the Triple Energy Window Scatter Correction Method in Gadolinium-159 Single Photon Emission Computed Tomography Using Monte Carlo Simulation

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خلاصه مقاله:

Introduction: In radionuclide imaging, object scatter is one of the major factors leading to image quality degradation. Therefore, the correction of scattered photons might have a great impact on improving the image quality. Regarding this, the present study aimed to determine the main and sub-energy windows for triple energy window (TEW) scatter correction method using the SIMIND Monte Carlo simulation code in Gadolinium-159 (Gd-159) imaging. Material and Methods: The energy window was set for various main energy window widths (i.e., 10%, 15%, and 20%) and sub-energy window widths (i.e., 3 and 6 keV).Siemens Medical System Symbia fitted with a high-energy collimator was used with Gd-159 point source positioned at seven locations inside the cylindrical water phantom. A comparison was made between the true primary to total ratio (calculated by SIMIND) and the primary to total ratio estimated using TEW method. Results: The findings of this study showed that 20% of the main energy windows with 3 and 6 keV sub-energy windows were optimal for the implementation of the TEW method in Gd-159. Conclusion: According to the results, the optimal energy windows for Gd-159 scintigraphy were the sub-energy windows of 3 and 6 keV. These findings could be helpful in the quantification of Gd-159 imaging.Purpose : In radio-nuclides imaging, object scatter is one of major factors which leads to degradation of image quality. Therefore, the correction of scattered photons has a great impact to improve the image quality. The aim of this work was to determine the main and sub-energy windows for the triple energy window (TEW) scatter correction method using Monte Carlo simulation SIMIND code for Gadolinium-159 (Gd-159) imaging. Methods : Energy window was set for various main energy window width (10,15 and 20%) and sub energy window width (3 and 6 keV). Siemens Medical System Symbia fitted with High Energy collimator (HE) was imaged with Gd-159 point source positioned at seven locations inside cylindrical water phantom. The true primary to total ratio (calculated by SIMIND) and the primary to total ratio estimated using TEW method were compared.Results : A 20% of main energy window with 3 and 6 keV sub-energy windows were found to be optimal for implementation of the TEW method in Gd-159. Conclusion: The obtained results provide the optimal energy window for Gd-159 scintigraphy data and will aid the quantification of Gd-159 imaging.

کلمات کلیدی: