A Comparison between Filtered Back Projection SPECT Reconstruction and a New Iterative Reconstruction Algorithm: A Phantom Study

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Background. A new iterative reconstruction algorithms (WBR™) has been recently proposed for cardiac SPECT. The WBR™ technology, based on accurate modelling of the emission-detection process, was designed to improve image resolution by eliminating the effect of the LSF. Based on iterative OSEM technique the WBR™ model includes physical parameters such as LSF modelling, collimator parameters and variable radius orbit, affecting the SPECT resolution. Few data exist on the comparison between filtered back-projection (FBP) and WBR™.
Aim. The aim of this study was to compare the resolution performance of FBP and this new algorithm.
Methods. A standard 3 lines phantom for the assessment of tomographic resolution was used to compare central, radial, and tangential resolution in FBP and WBR™. A SPECT acquisition was performed with a dual-head camera equipped with a LEHR cast collimator over a 2*180° rotation every 3° in step-and-shoot. The pixel size was 3.4 mm, the orbit radius varying between 13 and 20 cm. The resolutions were calculated as the FWHM of the interpolated Gaussian profile of the transaxial slice of the line source. FBP was applied with a Ramp filter.
Results. With FBP, central, radial, and tangential resolutions were 13.1, 13.1, and 11.1 mm respectively. With WBR™ central, radial, and tangential resolutions were 8.6, 8.2, and 6.3 mm, respectively.
Conclusions. The new reconstruction algorithm, applied to a standard SPECT acquisition, is able to well compensate the orbit radius variations and resulted in better resolution when compared to conventional FBP.