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Scatter correction on its own increases image contrast in Tl-201 myocardium perfusion scintigraphy, but does it also improve diagnostic accuracy?

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Poor and variable spatial resolution of the gamma camera, the movement of the heart and, above all, the inclusion of scattered photons in the acquisition data contribute to the deterioration of image contrast in ^{201}Tl myocardium perfusion studies. Scatter correction algorithms may correct for the latter factor by removing (most of) the scattered photons from the acquisition data. ***Methods:*** In this study we investigated the contrast changes induced by the Triple Energy Window scatter correction method (TEW) applied to clinical ^{201}Tl myocardium perfusion studies and its influence on the reading of the images. Stress and rest studies of 30 consecutive patients were used for this study. Maximum image contrasts were measured between the myocardium and the left ventricular cavity in four mid-ventricular short axis slices, as well as between normally and abnormally perfused myocardium using bull's-eye displays of the activity within the myocardium. To assess image quality and perfusion abnormalities, an experienced nuclear medicine physician, blind to patient characteristics, visually reviewed all studies. ***Results:*** In all individual measurements, the maximum contrast after scatter correction was higher than without correction ($p < 0.001$). The average increase in contrast between the myocardium and the left ventricular cavity was 43% and 48% for stress and rest studies respectively. The contrast within the myocardium increased by 25% and 32% respectively. After TEW, image quality was rated lower in almost half of the studies, while in only one study the quality was rated higher. In stress studies 11 additional perfusion defects were observed, with rest studies revealing 15 more defects after TEW, but this difference was not significant. Cohen's kappa indicated a moderate agreement of the image reading between studies with and without scatter correction. ***Conclusion:*** We conclude that image contrast improves significantly by scatter correction. However, image quality decreased as a result of an unfavorable signal-to-noise ratio. As an overall result, no significant change in the clinical outcome of the studies could be shown. Additional training of the readers may be required to obtain optimal results.

Key words: scatter correction, image contrast, myocardium perfusion study