

## IMPROVED PARATHYROID SPECT IMAGE QUALITY WITH THE WIDE BEAM RECONSTRUCTION TECHNIQUE

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**Objectives:** The wide beam reconstruction (WBR™, UltraSPECT Ltd, Haifa, Israel) is an iterative reconstruction algorithm designed to improve image resolution by compensating the effect of the line spread function and suppression of noise. The aims of this study were to compare the image quality between routine OSEM and the WBR™ techniques in parathyroid SPECT imaging, and to correlate results from each technique with results of combined dual-isotope and dual phase pinhole imaging.

**Methods:** Forty-six patients (pts) with primary hyperparathyroidism (12M/34F, age 14 to 89 yrs) underwent parathyroid scintigraphy (PS), which consisted of an anterior 123I view followed by early and delayed 99mTc-sestamibi views of the neck, all using a pinhole collimator. SPECT images of the neck/chest using a dual head gamma camera equipped with a high resolution, low energy parallel hole collimator were obtained between the early and delayed sestamibi pinhole imaging. 46 SPECT studies were reconstructed using routine OSEM and WBR™ technique, yielding 92 SPECT images sets. The order of display of the 92 SPECT image sets (46 OSEM & 46 WBR™) was randomized. Two nuclear medicine physicians blinded to the results of pinhole views reviewed the randomly mixed 92 image sets, scored each on a 1-10 scale for image quality, and recorded the location of abnormality. After decoding, each SPECT result was compared with the official results of the combined dual-isotope and dual-phase pinhole views to calculate overall concordance rate. Wilcoxon signed rank sum test was used to evaluate the results.

**Results:** Overall, the WBR™ images were considerably sharper and clearer, yet only minimally noisier. In 43 of the 46 pairs, the WBR™ images received a higher score in image quality from both reviewers (mean 6.7 vs. 4.6, and median 7 vs. 5;  $p < 0.0001$ ). Even in each of the remaining 3 patients, 1 of the 2 reviewers scored WBR™ higher. When correlated with the official reading of integrated pinhole I-123 images and dual phase sestamibi images as the reference standard, WBR™ and OSEM showed a concordance rate of 56.5% and 54.3%, respectively, but a considerably different partial concordance rate of 19.6% vs. 5.4% as well as discordance rate of 23.9% vs. 40.2%, respectively.

**Conclusions:** The WBR™ reconstruction algorithm applied to sestamibi parathyroid SPECT imaging yields a significantly better image quality than conventional OSEM reconstruction technique, which allows improved lesion localization.