EXPEDITED PLANAR BONE SCAN ACQUISITION USING WIDE BEAM RECONSTRUCTION

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Objective: To compare image quality of whole body bone scans acquired in the following three modes: Routine, 15 minutes, full time acquisition (FT), acquisition at half of the full time (HT) and a half time scan followed by Wide Beam Reconstruction (WBR^{TM}, UltraSPECT) enhancement. The WBR^{TM} algorithm accomplishes resolution recovery simultaneously with consideration of the statistical behavior of the emission and the noise, in order to achieve noise control. The planar image is then processed to yield resolution enhancement while suppressing noise.

Methods: 11 patients (Ages 41-72; mean age: 49, 9 females), in whom foci of increased uptake were detected on anterior and/or posterior FT bone scans, consented to undergo an additional HT acquisition. WBR^{TM} was applied to the HT image. 125 foci of increased uptake, most of them abnormal and some probably physiological, were identified on the FT bone scan. Each focus was given a score on a scale of 0 to 8, to indicate an expert overall impression of the quality of focus representation in each of the 3 modes (0 representing no focus observed and 8 representing the highest quality and confidence). Additionally, image noise or non-uniformity (NU) was estimated as the ratio between the standard deviation to the mean counts within a region of interest drawn over the normal femur.

Results: Foci scoring on the unprocessed HT images was inferior to FT (Mean 2.69 vs. 3.91; $P<<0.001$). HT-WBR images scored higher compared to FT (Mean 5.3 vs. 3.91: $P<<0.001$). At the same time, NU was significantly lower for the HT-WBR (12%) as compared to both FT (33.5%) and HT (46.7%); $P<<0.001$.

Conclusions: Our preliminary study suggests that when whole body bone scanning time is halved, the WBR^{TM} method can effectively suppress image noise and simultaneously restore lesion detectability. Further research is needed to prove that false positive detection is not created in the process.