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**Abstract**

**TITLE:** OSEM and WBR half-time gated myocardial perfusion SPECT: a comparison to filtered backprojection

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**ABSTRACT BODY:**

**Objectives :** Compared to filtered back projection (FBP), OSEM with resolution recovery (OSEM-RR) and wide beam reconstruction (WBR)(UltraSPECT Ltd.), which resolve resolution and suppress noise simultaneously during reconstruction, have been shown to maintain/improve myocardial perfusion SPECT quality, even with low count density half-time acquisitions. We postulated that their characteristics would be advantageous for gated SPECT, where each frame is only 1/8th the count density of the summed perfusion images.

**Methods :** An 8 mCi rest/32 mCi stress Tc<sup>99m</sup> sestamibi protocol was used. 15-min FBP, and additional 7-min OSEM-RR and WBR post-stress 8-frame/cardiac cycle SPECT scans were acquired with 90°-angled dual-headed detectors equipped with high resolution collimators in 82 patients (48F,34M)(123-252 lbs). Gated image quality was graded visually: 1 (poor) – 4 (excellent). In 42 patients with perfusion defects regional LV wall motion (WM) was scored: 0 (normal)– 4 (dyskinesis) in a total of 50 vascular territories with defects. Using Myometrix software (GE Healthcare), post-stress EDV, ESV, and EF were calculated for each method.

**Results :** [table]

Despite half-time acquisitions, compared to FBP, image quality increased marginally with OSEM-RR (p=0.09) but very significantly with WBR (p=1.9x10<sup>-21</sup>). The WM score was greater only for WBR (p=4.8x10<sup>-8</sup>). Although quantitative parameters correlated well with those determined by FBP (all EF r's > 0.85; all volume r's > 0.94), EFs were significantly lower (p=0.0001 for OSEM-RR, 3.4x10<sup>-14</sup> for WBR), primarily due to a decrease in EDV with OSEM-RR (p=7.3x10<sup>-13</sup>) and an increase in ESV with WBR (p=9.2x10<sup>-5</sup>).

**Conclusions :** Half-time OSEM-RR and particularly WBR improve gated SPECT diagnostic quality compared to FBP due to increased resolution and reduced noise. However, these attributes, which affect endocardial edge detection, result in a systematic offset in EDV, ESV, and EF.

	FBP	OSEM-RR	WBR
Image Quality	3.7±0.8	3.9±1.0	4.8±0.4
WM score	1.9±1.1	2.1±1.3	2.8±1.0
EF	56.1±14.3	52.5±15.9	48.7±13.1
EDV	109.3±45.8	94.8±45.2	106.0±45.4
ESV	53.4±38.0	49.5±36.7	58.4±37.5