**Accuracy and Variability of 3D-MSPECT for Estimating the Left Ventricular Ejection Fraction as a Function of Gating Frames and Reconstruction Filter.**

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**Objective:** The objective of this study was to determine the accuracy of the quantitative software program 3D-MSPECT for the estimation of left ventricular ejection fraction using myocardial perfusion SPECT data. The variability of the EF estimates as a function of the number of gating frames and the reconstruction filter was also characterized.

**Methods:** Fifty one consecutive patients having a gated myocardial perfusion SPECT study and a contrast ventriculogram (CVG) within 90 days of each other were selected. The myocardial perfusion data was acquired in 16 frames/cycle on a triple detector SPECT system in a 64x64 matrix with 6.3mm pixels for a 16 minute duration. Prior to reconstruction, an 8 frame study was constructed from the 16 frame data. Both data sets were reconstructed over a 180 degree arc from RAO to LPO using filtered backprojection with a ramp filter. Both transverse files were filtered with 3D Butterworth filter of order 4 and a cutoff (fc) of 0.20. Similar filters with fc= 0.15 and fc=0.25 were applied to the 16 frame transverse file. All transverse data files were resliced as a group to provide short axis (SA) data sets. The SA data was input to 3D-MSPECT which computed the left ventricular EF and volumes over the cardiac cycle.

**Results:** The EFs from 16 frame data with filters 0.25 and 0.20 correlated quite well, (r=0.97), but the fc=0.15 data did not correlate as well (r=0.82) due to the elimination of the LV cavity at end-systole. A fc=0.15 filter appears to be the lower limit for heart volumes < 100ml. Both the fc=0.25 and fc=0.20 data correlated quite well with the CVG data (r=0.84). The correlation of the 16 and 8 frame data was excellent (r=0.98) with the mean bias of -3.2% for the 8 frame data compared to the 16 frame data.

**Conclusion:** The variability of 3D-MSPECT EF values due to filter selection is quite low between 0.15 and 0.25, where 0.15 is the lower limit for small hearts. The accuracy of the EF estimates was excellent for both 8 frame and 16 frame data sets. Based on this data, 3D-MSPECT provides flexibility in processing parameters with minimal effects to the EF estimates.

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