Dependency of Rb-82 normal distribution on PET camera and processing

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Abstract

Objectives With SPECT myocardial perfusion imaging, different cameras and processing protocols result in variable normal myocardial tracer distributions, necessitating multiple normal databases for quantification. The objective of this study was to investigate the variation of normal myocardial Rb-82 distribution with different PET cameras and processing.

Methods Normal Rb-82 distributions were constructed from separate 40 low-likelihood (20F/20M) populations imaged on two cameras, GE DST and GE D690, at two different institutions using standard PET imaging parameters. Both PET systems provide corrections for attenuation and scatter with the D690 imaging in 3D with 3D modeling. Gender specific and composite databases were constructed for each system and regional 9-segment distributions were compared using Student’s t-test. Quantitative defect size and summed stress score (SSS) were compared between databases using the Corridor4DM software in 175 consecutive patients referred for Rb-82 PET imaging. In a subgroup of 56 patients, quantitative perfusion was correlated to coronary angiography.

Results Comparison of regional distributions showed only the apex to be mildly different (p=0.046) between the two cameras. In 175 patients, both defects size and SSS were highly correlated (Pearson correlation 0.99 for both and slopes of 1.00 and 0.99, respectively). Bland-Altman differences were 0.5+/-3.1(%) for defect extent and 0.2+/-1.8 for SSS. Angiographic correlation showed no significant differences for the detection of CAD by patient or by vessel. Similar results were found when comparing the composite and gender specific distributions on the same system or between systems.

Conclusions Rb-82 normal distributions were found to be clinically equivalent between two camera systems and between genders. This study demonstrates that a single normal distribution may be used for different cameras and centers enabling comparison and pooling of quantitative data.