Dependence of the Normal Perfusion Database on Body Habitus and Number of Patients.

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Objective: Normal perfusion databases are an essential component for the quantitative analysis of myocardial perfusion SPECT imaging. Due to the large variability in body habitus, regional databases have been proposed. The inclusion criteria for creating a region-specific database and the minimum number of studies required for inclusion in a database was investigated.

Methods: For this study, 178 consecutive patients (males: 100, females: 78) having a high dose (30mCi Tc-99m-Sestamibi) gated SPECT perfusion study were included. Images were reconstructed from RAO-LPO using filtered backprojection. The patients had less than a 5% pre-test likelihood of coronary heart disease (CHD) and achieved suitable exercise limits. Studies were free of motion artifact, and the images were visually normal. Polar maps and gender specific normal databases were constructed using 4D-MSPECT software. Four independent databases of 20 patients, 2 independent databases of 40 patients, a single database of 60 studies, and a single database of 80 studies were created from random samplings of the population with no exclusion based on body habitus. To determine the diagnostic accuracy of each of the databases, a population of 317 patients (114 low likelihood normals, 36 angiographically normal, and 167 with angiographic stenoses) was studied. Each patient underwent perfusion SPECT using the dual isotope protocol. Diagnostic accuracy was determined at a defect threshold of 2.5 .

Results: Considerable variability was seen in diagnostic accuracy with databases comprised of less than 40 patients (accuracy for CHD: 80% to 84%, $p<0.05$). The variability was attributed to differences in the normal variance maps due to body habitus. For databases with 60 or greater patients, variability in diagnostic accuracy values were significantly less (accuracy for CHD: 84% to 85%, p=NS).

Conclusion: Databases created with less than 40 normals will require some exclusions based on body habitus to reduce the variance estimates, thereby maintaining sensitivity levels in the 80-90% range at the expense of specificity. With databases comprised of 60 or more normals, there is less variability in the variance maps, which provides more stable diagnostic thresholds and higher diagnostic accuracies.

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