Effect of Tissue Attenuation on Cardiac SPECT Specificity

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The origin of attenuation artefacts is inconsistent projection information used with reconstruction algorithms that cannot model the physical effects of attenuation. Breast tissue in women and the left hemidiaphragm in men are the most frequently identified sources of attenuation artefacts. Test specificity is impacted when attenuation artefacts resemble true hypoperfusion by overlapping known coronary artery territories and can be incorrectly associated with coronary artery disease (CAD). Several studies have shown that attenuation corrected myocardial perfusion SPECT may improve the specificity and consequently the accuracy of the detection of CAD (1-3). Expert readers always utilize both the AC and NC data when interpreting the AC scans visually as recommended by the ASNC guidelines (1). However, previous studies develop and validate the stress normal limits and criteria for abnormality for quantitative same-day rest-stress Tc-99m sestamibi AC SPECT studies by use of a gender-independent normal database (3). Comparison of the prospective quantitative results for detection of CAD from the AC population to the non-AC results demonstrated a significantly higher specificity with AC with no significant loss in sensitivity. Regional analysis showed that significant gains in the specificity of detecting the absence of RCA and LAD disease contributed to this gain in overall specificity. Similarly, the normalcy rate significantly improved after correcting for attenuation (3). More recently, a combined quantitative parameter derived from AC and NC myocardial perfusion SPECT has been validated. There are significant improvements in the diagnostic performance measured both by the area under ROC curves and specificity and accuracy when using the combined parameter as compared to using NC data or AC data alone (4).

References


