EL11. An Emission Based Attenuation Correction Technique for Myocardial SPECT Studies

P.T. Kirchner, M.T. Madsen, G.T. Kelly, R. Aktay and M.E. Schurrer

Division of Nuclear Medicine, University of Iowa, U.S.A.

Our emission-based attenuation correction technique uses Tc-99m MAA to define lung borders and an elastic Tc-99m wrap to define the outer body contours. The Tl-201 SPECT study is acquired simultaneously with the Tc-99m data for lung and body contours (dual isotope acquisition). The attenuation map of the thorax is found by segmenting the reconstructed data from the Tc-99m window and using assumed attenuation coefficients. The tomographic attenuation map is applied with appropriate values for Tc-99m to a subsequent stress sestamibi SPECT study. Both SPECT studies are corrected using the derived attenuation map and an iterative filtered backprojection algorithm.

Twenty volunteer patient studies have shown that the additional lung and body wrap activities do not degrade the myocardial SPECT images. Attenuation correction of rest and stress studies in a second group of 20 patients modified the clinical diagnosis in 9/20 cases.

Mathematical simulations estimated the upper limit for reconstruction errors caused by 20% falsely high or low attenuation coefficients to be less than 5%. SPECT studies of an anthropomorphic thorax phantom disclosed less than a 5% change in the relative counts in the heart wall even when the lung concentration was a factor of 4 greater than that used in the patient studies. The technique was able to correct for simulated breast tissues to within 10% of true values with only 1 iteration.

Our emission-based technique shows promise as an inexpensive and efficient alternative to transmission techniques.