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Correction of transmission contamination in SPECT imaging

Simultaneous emission and transmission tomography
with $^{67}\text{Ga}/^{153}\text{Gd}$

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The transmission and emission data are acquired simultaneously with ^{153}Gd and ^{67}Ga respectively. The distribution of scatter and spill over in transmission window were estimated. The scatter function, spillover and scatter fractions were estimated at different depth in different media and the relationship was established. The corrected transmission projections were reconstructed and the corrected attenuation map was scaled to take into account the difference in photon energies of the two radionuclides. Combined emission images of a thorax phantom and human volunteer were reconstructed using the OSEM algorithm. It was found that the bi- exponential scatter function is independent of material and depth of source. The scatter fraction and spillover both depend on the thickness and density of attenuating material. Corrected transmission data using an iterative process improved the contrast and quantitative accuracy. We could conclude that transmission based correction method can be applied to improve the attenuation map used in attenuation correction of SPECT images.



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