CORRECTION OF NON-TRUE COINCIDENCE IN 3D PET USING BEAM STOPPER DEVICE

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Purpose **:** Position Emission Tomography (PET) is a non-invasive technique used in nuclear medicine, which provides physiological information using molecular tracers. As 3D PET data acquisition increases, random and scatter coincidence events increase relevantly. They cause a uniform distribution of background on the image and degrade the accuracy of quantitative analysis. The conventional corrections for random and scatter coincidences are achieved by the delayed window technique and Single Scatter Simulation (SSS) method. However, they increase noise and reduce image accuracy.

Material and Methods **:** The aim of this study is to examine the feasibility of using a beam stopper (BS) for correcting non-true coincidence events. The BS placed on the line of response (LOR) at two different locations rotating with constant degrees absorbs a particular fraction of the true events. The non-true coincidence, non-blocked at the LORs by each stopper, can be estimated. Assuming that the non-true radiation is a spatially slow-varying distribution, the whole non-true sinogram can be recovered using cubic-spline interpolation from these local measurements. Beam stopper rotated (BSR) reduces the effective sampling distance without increasing the number of the stoppers. In this study, we performed Monte Carlo (MC) simulations for 3-D PET with the GATE software for a cold phantom to conduct the BSR method.

Result **:** The estimate of non-true event fraction in a large FOV using BSR method is 31.55% and is close to the result of Monte-Carlo simulation. The activity ratio of region approaches the initial input quantity.

Conclusion **:** We conclude that the proposed correction method is effective and better than conventional correction schemes without increasing scan time. In sum, the BSR method is a convenient and effective correction for non-true coincidences in 3D PET.

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Key words: Beam stopper, Scatter event, Random event