Annals of Nuclear Medicine Vol. 16, No. 5, 363–367, 2002

SPECT imaging with off-set detector system: Comparison of sampling angles 2, 4 and 6 degrees

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Purpose: We evaluated an off set reconstruction method for single photon emission computed tomography (SPECT), and compared it with the conventional on set reconstruction method, using sampling angles of 2, 4, and 6 degrees. ***Method:*** A triple-detector system was used. In the off-set acquisition, sampling angles of the opposite detector were shifted 1/2 of the sampling angles of 2, 4, and 6 degrees. For example, when projection data were acquired every 6-degrees (sampling angle = 6 degrees), the projection angles were at 0°, 6°, 12°, and 174° with one detector, and 177°, 183°, 189°, and 357° with the other, opposite, detector. The conventional on set reconstruction images were compared with an off set reconstruction for a pool phantom of uniform concentration, a hot rods phantom, a myocardial phantom, and a human study. ***Results:*** The off set reconstruction method was better at all three sampling angles. FWHM (mm) were 11.02 at off-set versus 11.17 at on-set (sampling angle 2°), 11.13 at off-set versus 11.48 at on-set (sampling angle 4°), and 11.24 at off-set versus 11.64 at on-set (sampling angle 6°), respectively. In human myocardium SPECT, visualization of the interventricular septum and cardiac cavity was improved. ***Conclusion:*** Off set reconstruction by means of filtered back projection will be an efficient sampling mode, having a larger number of effective projection angles.

Key words: filtered back projection, off set reconstruction, 360-degree projection data, SPECT