

ABSTRACT

Sensitivity testing is one of the critical parameters in the acceptance testing and quality control of a Single Photon Emission Computed Tomography (SPECT) system. This study aims to evaluate changes in the planar sensitivity of a SPECT system in response to variations of the distance between the collimator and the radiation source. The study was conducted on a GE Discovery NM/CT 670 SPECT/CT system equipped with LEHR collimators. The test utilized a planar radiation source of Tc-99m radionuclide with an activity of 2-3 mCi. The distance between the planar radiation source and the collimator was varied at 10 cm, 11 cm, 12 cm, 13 cm, 14 cm, and 15 cm. Planar sensitivity analysis was performed using two calculation methods: without scatter correction and with scatter correction using the Dual Energy Window (DEW) method. The test results demonstrated that the planar sensitivity values on the SPECT system remained constant across all distance variations. The average planar sensitivity values without scatter correction for detector 1 and detector 2 were 81.751 cps/MBq and 80.804 cps/MBq, respectively. Meanwhile, the calculation with scatter correction showed average planar sensitivity values for detector 1 and detector 2 at 75.858 cps/MBq and 74.544 cps/MBq, respectively. The percentage difference in sensitivity values between the detectors, both without and with scatter correction, met the passing criterion of $\leq 5\%$. Based on the measurement results, it can be concluded that the planar sensitivity value of the SPECT system is not affected by changes in the distance between the collimator and the radiation source

Keywords: Planar Sensitivity, SPECT, Tc-99m, LEHR Collimator, Distance Variation.