ABSTRACT

A SPECT gamma camera system requires good spatial resolution performance to produce accurate diagnostic images. This study aimed to analyze the effect of field of view (FOV) variations on the spatial resolution of a planar SPECT gamma camera system. The test was conducted using a Tc-99m source filled into capillary tubes with diameters of less than 1 mm to form line sources. Four line sources were arranged in a square pattern with a spacing of 10 cm between adjacent sources and positioned on a millimeter block. Image acquisition was performed using a Low Energy High Resolution (LEHR) collimator on detector 1 and detector 2 with FOV variations corresponding to zoom factors of 1.0, 1.14, 1.33, 1.5, 1.6, 2.0, 2.5, 3.0, 4.0, and 5.0. Spatial resolution was analyzed using the Full Width at Half Maximum (FWHM) parameter, while image linearity was visually assessed to verify the absence of geometric distortion. FWHM analysis performed using the Xeleris workstation and FIJI software with the IAEA Nuclear Medicine Quality Control (NMQC) toolkit showed FWHM values ranging from 3.6 to 4.7 mm, which met the acceptance criterion specified by GE (≤ 6 mm ± 10%). Smaller FOV settings tended to produce lower FWHM values, indicating improved extrinsic spatial resolution. This improvement was attributed to the reduction in pixel size, which enhanced image sampling and enabled a more accurate representation of the count distribution profile or line spread function (LSF). The line source images remained linear in both the horizontal and vertical directions across all FOV settings, with no observable geometric distortion. Therefore, FOV affects the extrinsic spatial resolution of a planar SPECT gamma camera, while image linearity remains well maintained without geometric distortion.

Keywords: *planar SPECT gamma camera, field of view (FOV), extrinsic spatial resolution, FWHM, line source.*