

ABSTRACT

Center of Rotation (COR) is one of the essential quality control (QC) parameters in Single Photon Emission Computed Tomography (SPECT) systems because it directly affects image reconstruction accuracy and the quality of diagnostic information. Misalignment between the mechanical center of rotation of the gamma camera and the image matrix center may cause image artifacts, geometric distortion, and reduced spatial resolution. This study aimed to analyze COR values obtained using Xeleris software, calculate COR offsets using Fiji software, compare the results of both methods, and evaluate their agreement in SPECT quality control assessment. This quantitative experimental study utilized secondary data from COR quality control tests performed on a GE Healthcare NMCT 870 SPECT system at the Nuclear Medicine and Molecular Theranostics Department of Dr. Sardjito General Hospital, Yogyakarta. Data acquisition was conducted using a Tc-99m point source and a Low Energy High Resolution Sensitivity (LEHRS) collimator in both High (H) and Low (L) modes. Data analysis was performed using Xeleris software and Fiji software equipped with the IAEA-NMQC Toolkit plugin. The results showed that all measurements analyzed by Xeleris passed the QC criteria, with peak energy values ranging from 140.6 to 142.9 keV and Full Width at Half Maximum (FWHM) / Energy Extrinsic Resolution (EER) values ranging from 8.4% to 8.6%. Fiji analysis yielded COR offset values of 0.35775–0.86337 mm along the X-axis and 0.91096–1.67002 mm along the Y-axis. Both methods demonstrated consistent trends, including a slight increase in deviation at the end of the observation period, indicating possible mechanical drift. Nevertheless, all COR values remained within the recommended tolerance limits, confirming that the system was suitable for clinical use. These findings indicate that Fiji can serve as a valid and independent alternative method for COR quality control verification in SPECT systems.

Keywords: *Center of Rotation, SPECT, quality control, Xeleris, Fiji.*