

Purpose: To evaluate and compare the imaging performance of two popular cone-beam CT (CBCT) systems used for image-guided radiation therapy. **Method and Materials:** The study was carried out on Varian Clinac iX equipped with OBI/CBCT and Elekta Synergy equipped with XVI/CBCT. The performance evaluation involved comparison of volumetric image data taken from two systems. Two CT phantoms (Catphan-504 and 600, Phantom Laboratory, Salem, NY) were scanned using the Varian CBCT with standard half and full fan setup, and Catphan-600 was also scanned on Elekta CBCT with half and full circle scans at different resolutions and field-of-view (FOV). In-house image analysis software was used to measure the mean CT numbers, standard deviations, and image noise for 5x5 mm ROI in seven different density materials. Image quality, reproducibility, position correction, and geometric accuracy were also evaluated with markers in a small alignment phantom. The image quality measurements included uniformity, linearity, image resolution, density accuracy, and image noise. **Results:** The linearity for both phantoms was fairly consistent using the Varian CBCT. The Elekta CBCT with half circle 27x27 FOV had higher CT numbers as compared to its other three modes. With the same phantom for low-density materials, the CT numbers with Varian CBCT were 300-600 units lower than those with Elekta CBCT. The image noise of full and half circle 27x27 FOV were about 5 and 2 times, respectively, higher than for the Varian CBCT, while the image noise levels in its other modes were similar. The accuracy of the image systems was comparable. **Conclusion:** This study confirmed the comparability of imaging performance of both systems. While the Elekta CBCT provided timely image reconstruction, relatively higher image noise was observed. Our objective evaluation of imaging performance demonstrated that the volumetric data rendered from both CBCT systems is accurate as compared with conventional CT.