

AbstractID: 9057 Title: An image quality comparison study between XVI and OBI CBCT systems

Purpose: To evaluate image quality on the X-ray Volumetric Imager (XVI[®], Elekta Medical Systems) and the On-Board Imager (OBI[®], Varian Medical Systems) using a CatPhan[®] phantom in a single institution setting.

Method and Materials: We evaluated four major image quality indices, including high and low contrast resolution, noise, and contrast-to-noise (CNR) ratio. For the XVI unit, the four manufacturer-supplied protocols were measured. For the OBI unit, full bow-tie and half bow-tie filters were used in combination with the “full-fan” and “half-fan” modes. The mAs was varied for each protocol. High contrast resolution was evaluated using number of line pairs visible per cm and low contrast resolution was evaluated using the visibility of low resolution disks. Noise was computed over circular regions of interest (ROIs) on the uniformity module. CNR was calculated using a polystyrene insert and the background of module CTP404. The images were analyzed using MATLAB.

Results: Up to 10 line pairs per cm are visible on OBI for high mAs settings and so are most low contrast discs. 2 line pairs per cm and none of the low contrast discs are visible on XVI. Noise values fall from 35 to 6 on OBI and vary between 10 and 3 for “prostate” protocol on XVI with increasing mAs. On OBI, CNR steadily increased from 4 to 20 with increasing mAs. For the “prostate” protocol on XVI, CNR varies from 10 to 23 and generally increases with mAs. For the four XVI protocols evaluated, mean pixel values in ROIs are found to decrease with mAs.

Conclusion: Image quality parameters are generally found to be better on OBI as compared with XVI for clinical protocols. However, this is important to be viewed in the context of the observation that OBI generally delivered higher doses than XVI.

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