

AbstractID: 7680 Title: An evaluation on the influence of MU number and field length on MV-CBCT image quality on a Siemens Oncor linac machine

**Purpose:** We present an empirical evaluation of several factors influencing image quality in megavoltage cone beam CT (MV-CBCT) to provide guidance for optimization of these parameters in a clinical setting.

**Method and Materials:** A commercial system capable of MV-CBCT imaging was recently installed in our clinic (MVision, Siemens Oncology Care Solutions). The system uses a 41 cm x 41 cm electronic portal imaging device specially optimized for 6 MV cone beam acquisition. Images are reconstructed from a 200 degree rotation of the gantry, resulting in a field of view of approximately 27x27x27 cm<sup>3</sup>. In preparation for routine use in image guided radiotherapy, we investigated the effect of varying the MU number and scan length on soft tissue contrast and system resolution. MV-CBCT images were acquired of several phantoms using the Y-jaws to vary the scan length, from 1.0 to 27.4 cm while keeping the X-aperture fixed at 27.4 cm. Imaging was repeated for three MU setting of 5, 10, and 20. The signal to noise ratio (SNR) and the contrast to noise ratio (CNR) were determined in a low-contrast CT phantom. A second phantom containing a series of line pair objects was used to assess spatial resolution. The image quality in terms of SNR, CNR, and spatial resolution were scored with respect to the MU and field length.

**Results:** The SNR distribution exhibited a clear dependence on field length and MU number used in the acquisition. SNR improved significantly with increasing MU and with decreasing field length. CNR showed a similar dependence on both parameters, and was optimal at field lengths between 2 and 5 cm. Spatial resolution was independent of both parameters providing MU>5.

**Conclusion:** With 20 MU and 2~3 cm field length, MV-CBCT can produce very good soft tissue contrast providing the possibility of MV-CBCT based target delineation.