AbstractID: 10650 Title: Mega-voltage cone-beam computed tomography image quality: Effects of scan length and monitor units per projection

Purpose: To present a quantitative evaluation of the impact of scan length, monitor unit (MU)/projection, and total MU on the image quality in mega-voltage cone-beam computed tomography (MV-CBCT). We present results of a systematic comparison of contrast-to-noise ratio and modulation transfer function obtained for 9 varying acquisition protocols with the MVision system (Siemens Medical Solutions, Concord, CA). **Method and Materials:** Image quality is characterized by contrast, noise and spatial resolution. Utilizing the manufacturer's image quality phantom, we obtained sets of images from 9 different acquisition protocols of varying scan length, MU/projection, and total MU. The images are analyzed in terms of contrast-to-noise ratio (CNR) and modulation transfer function (MTF), which quantifies spatial resolution. **Results:** The CNR data suggest that the image contrast is not enhanced by increasing the MU/projection beyond 0.0675, but rather may be diminished. However, for comparable MU/projection the CNR is reduced from 7.25 to 4.8 by lowering the total MU from 15 to 8. For the same MU/projection the CNR is slightly better for the 360° scan compared to the 200° scan. On the other hand, the MTF analysis shows that neither the scan length, nor the sampling rate, nor the total MU have an effect on spatial resolution. Furthermore, the MTF analysis indicates that objects of spatial frequency larger than 0.3 line pair/mm cannot be resolved adequately with current MV-CBCT imaging irrespective of the scanning protocol utilized. **Conclusion:** The study shows that spatial resolution is not affected by acquisition or reconstruction parameters in MV-CBCT. However, the system is optimally used in terms of contrast-to-noise ratio with the default setting of 1 projection every degree. **Conflict of Interest:** This research was partially supported by Siemens Medical Solutions.