AbstractID: 13100 Title: Obtaining increased field-of-view in cone beam computed tomography using the standard centered detector geometry

Purpose: We present a novel image acquisition and reconstruction scheme for dramatically increasing the field-of-view (FOV) in cone beam computed tomography (CBCT) using a standard centered detector. The method enables CBCT datasets to be employed as a basis for treatment planning, since the entire extent of even very large patients can be imaged in a quantitative sense. Applications include planning for emergency cases based on CBCT images, and at Third World facilities that lack multislice-CT systems using megavoltage-CBCT. **Methods and Materials**: The projection acquisition scheme proceeds as follows: 1) The patient couch is offset (in height and lateral position) from its intended position ($\boldsymbol{x}_0$) at the start of treatment by a distance related to the amount of additional FOV required. 2) Projections are acquired over a limited arc. 3) The couch is offset from $\boldsymbol{x}_0$ by the same distance as in (1), but in the opposite direction 4) Projections are acquired over a second arc. Projections are corrected for scatter, beam-hardening and non-uniform beam profile, and then simultaneously reconstructed using an iterative algorithm**. Evaluation:** We image a pelvic anthropomorphic phantom using a Siemens ONCOR linac equipped with an amorphous-silicon detector. Dose calculation is then performed on the resulting extended FOV megavoltage-CBCT and a multislice-CT of the same phantom. **Results**: The full cross section of the phantom is reconstructed with only minor artifacts. The dose study shows almost identical dose distributions for the reference and EFOV dataset**:** the central percentage depth-dose profiles for a 10x10 cm^2 field exhibits a maximum deviation of 0.8%, illustrating the insignificance of the artifacts from a dosimetric perspective. **Conclusion**: The method increases the FOV of an ONCOR linac by 67% to 45 cm. This exceeds the capabilities of current extended FOV implementations that are based on offset-detector systems. The reconstructed volumes appear suitable for planning purposes.