AbstractID: 4912 Title: Quality assurance procedure for a kV cone-beam device.

Purpose: To establish a quality assurance procedure for kV cone-beam (CB) devices, and use the procedure to assess the accuracy and precision of a particular CB unit.

Introduction: The introduction of the Elekta CB system has created a need for a quality assurance (QA) procedure to test the system's reliability and accuracy and it's alignment with the MV treatment beam isocenter.

Materials and Methods: An acrylic phantom with dimensions of 18x19x18 cm^3 was used for this work. The phantom included a central slab made of polystyrene that contained two drill holes. One was drilled to the center of the cube, and the other was off to one side and established phantom orientation during scanning. The holes were left open during CT and CB imaging to minimize artifacts. The phantom was first positioned with the center hole at the accelerator mechanical isocenter. Repeated cone-beam datasets were acquired to determine the system's ability to detect and correct for known table shifts. Finally, the phantom was positioned with CB guidance and the beebee was placed in the center hole. The Winston-Lutz (WL) test in the phantom was preformed using the electronic portal imager (EPID). The differences between known and CB determined shifts and the WL test analysis were tabulated.

Results and Conclusion: The results showed that the cone-beam system was capable of determining the shifts applied to the QA phantom to within 0.5 $\pm$ 0.4 mm with the largest difference between the known and calculated shift of 1.9 mm. The mean agreement between the kV and MV isocenters was 0.5 mm $\pm$ 0.4 mm with the largest deviation of 1.3 mm. This QA study supports a conclusion that the Elekta CB system can be reliably used for positioning of patients with the accuracy in a 1 to 2 mm range.