AbstractID: 9612 Title: Commissioning and validation of a novel measurement-based IMRT QA method, incorporating dose recalculation on patient CT data

Purpose: A novel measurement-based IMRT QA method was tested which provides an accurate reconstruction of the 3D dose distribution in the patient model. This approach is a significant improvement over current QA methods since it allows direct and independent comparison of the doses calculated by the treatment planning system (TPS), including the 3D spatial dose distribution overlaid on CT data and contoured structures, as well as DVHs. **Materials&Methods:** The challenging RPC Head and Neck phantom was used for initial evaluation. A 6 MV, 7 field, 79 segment, step and shoot plan was developed satisfying required dose metrics. A 2D-array of dose chambers (MatriXX, IBA Dosimetry) was mounted on a linear accelerator. This device captured the delivered IMRT plan fluence in a pre-treatment QA context. The measurement data were read directly by the control software (COMPASS, IBA Dosimetry), which also provides the ability to import patient plan data from the TPS. The COMPASS software also includes a dose calculation engine and head fluence model. Beam commissioning procedures analogous to those of a TPS were required. Reconstructed dose and DVHs were compared to those calculated by the TPS. **Results:** The beam model in the COMPASS software was able to predict percentage depth dose and X and Y profiles (Dmax, 5, 10, 20 cm depths) for MLC-defined apertures ranging from 1x1-20x20 cm^2 to within 1.5% (percentage depth-dose), 2.0% (in-field profiles), and 2.5% (out-of-field profiles). The reconstructed doses in the RPC Head & Neck phantom were within -3 to +4% of those in the treatment planning system. DVHs compared to within 1%. **Conclusions:** A novel measurement-based IMRT QA method was tested. Reconstructed doses were overlaid on CT data and contoured structures, to enable a clinically relevant understanding of delivered under- or over-doseages as compared to the TPS plan. Research partially sponsored by IBA Dosimetry.