

**Purpose:** Experimental methods are commonly used for patient-specific IMRT verification. The aim of this work is to investigate the possibility of substituting the time and labor intensive IMRT QA with calculation based dose verification and log file analysis.

**Method:** 11 IMRT plans (5 head and neck plans, 3 rectum plans, 3 breast plans and 5 prostate plans) made using Pinnacle were recalculated using a QA phantom. All the plans were verified by ICs and 2D MapCheck measurements and compared to the independent dose calculation using Eclipse. The deviations between dosimetric measurements and independent dose calculation in a QA phantom were evaluated. The plans with patient anatomy were imported to Eclipse for 3D dose calculations. The DVHs and point doses calculated by Pinnacle and Eclipse are evaluated for PTV and critical structures. To verify data transfer and performance of the delivery unit dynalog file analysis was performed.

**Results:** Average deviation between IC measurements and point dose calculations with Pinnacle and Eclipse for Head and Neck were  $1.1 \pm 1.3\%$  and  $1.4 \pm 1.6\%$ , respectively. For MapCheck measurement, the mean gamma value with 3% dose difference and 3 mm distance-to-agreement were within 1.5% for most plans. The mean 3D dose differences calculated from two different treatment systems are with 3 % for Head-and-Neck cases and are within 2% for other plans. The dynalog analysis shows that the gantry angle, jaw position, collimator angle and MLC positions have the passing rate of above 97%. The independent dose calculation with the dynalog analysis takes only 37 minutes, while experimental approach, which takes up to 3 hours.

**Conclusion:** Independent dose calculation followed by dynalog file analysis is a reliable tool to verify the IMRT treatment. With the IMRT QA program becoming more mature, independent dose calculations and dynalog analysis may be used to replace experimental based verification methods.