AbstractID: 10255 Title: Pretreatment quality assurance program for prostate IMRT fields based on absolute dose measurements at specific control points

Purpose: A quality assurance (QA) program for IMRT, fully based on dosimetric measurements with a 2D matrix of ionization chambers has been established. The program included a pre-treatment comparison between calculated doses for a dosimetric setup using Pinnacle^3 treatment planning system (TPS), and measured doses under the same experimental configuration in solid water phantom (SWP).
Methods and Materials: As control points, coordinates of the isocenter and specific locations of extreme doses for every IMRT field were used. The initially optimized IMRT beams were transferred by the TPS to simulate their dose distributions in a SWP. In the TPS, control points of doses were obtained at SAD = 100 cm and depth of 10 cm using the SWP (30×30×30 cm^3). Beams were irradiated under the same beam setup conditions as were used for the planning. The absolute doses of control points were measured using a 2D matrix of ionization chambers (I'mRT). In 30 prostate patients, pre-treatment differential absolute doses for specific control points for every IMRT beam were obtained.
Results: Dose calculations for entire patient group showed that inside the field the averaged mean isocentric dose was in the range from −1% to 1.5%. The dose uncertainty at coordinates of the maximum and minimum doses was in the range from −0.8% to 1.4% and from −0.8% to +0.7%, respectively.
Conclusions: As the range of dose uncertainties measured at the central axis is the same for the control points with a random offset from coordinates at the central axis, it is concluded that the 2D matrix can be used to provide differential absolute dose measurements as a part of the pre-treatment IMRT QA with high accuracy and resolution. Dose errors demonstrated in all measured fields were clinically relevant.