AbstractID: 9077 Title: Dosimetric validation of a commercial Monte-Carlo based IMRT planning

Purpose: Recently, the inverse planning planning system Monaco (CMS Inc) version 1.0.0 was installed in our department. The Monaco system incorporates a two-stage IMRT optimization procedure and a version of the XVMC Monte Carlo dose calculation algorithm. In the first stage the fluence distribution of the IMRT beams are optimized using hard ('biological') constraints for the organs at risk. In the second stage, the beams are segmented and their weights optimized while still satisfy the hard constraints. In this study we investigated the dosimetric accuracy of the XVMC dose engine implemented in MONACO. **Method and Materials:** For an ELEKTA(r) linac (6, 10 and 18 MV) depth dose curves, dose profiles and output factors were measured in a waterphantom using source-to-surface distances (SSD) between 80 and 100 cm. Symmetric fields ranging from 2x2 to 30x30 cm and off-axis fields of 2x2 3x3 cm and 2x10 cm were used. In addition, GAFCHROMIC(r) film measurements were performed in anthropomorphic phantoms to validate the dose accuracy in inhomogeneous media. Furthermore, the dosimetric accuracy of IMRT fields for prostate and head-and-neck cancer treatments was evaluated. All fields were simulated in Monaco using a grid size of 2 mm and variances of 0.5 and 1%. **Results:** The agreement between measured and calculated dose distributions was generally within 2%. Only in the build-up region larger dose differences were observed, especially for the highest photon energy. No impact of the SSD on the dose accuracy was observed. Calculation times for a 10x10 cm field and a 0.5 or 1% variance were 75 and 23 minutes, respectively. Conclusion: A very good agreement was observed between Monaco Monte Carlo dose calculations and measurements, allowing clinical introduction.