AbstractID: 10653 Title: Assessment and Management of Dose Perturbations due to the Treatment Couch

Purpose: To develop a model which can predict beam intersection with highly attenuating couch elements and determine the impact of the treatment couch on dose distribution.

Method and Materials: Our method is based on fusing a CT image set of the couch with the patient CT data set, importing regions of interest characterizing couch elements and assigning appropriate densities in the TPS. A retrospective study was performed on patient plans that posed difficulties in beam-couch intersection during setup. The impact of the treatment couch was assessed through a comparison between clinical plans that excluded and included the couch model. The percentage of PTV covered by 95% of the prescribed dose and the mean CTV coverage were compared. Dose compensation strategies for IMRT treatments with beams passing through couch elements were investigated using a four-field IMRT plan with 3 beams passing through couch elements.

Results: The model agrees with positioning measurement to within 1° gantry rotation; prediction of dose is accurate to within 2% (Table 1, Figure 1). Inclusion of the couch resulted in an up to 3% reduction in PTV coverage and an up to 1% reduction in mean CTV coverage. Using film dosimetry, we were able to show that ignoring couch effects can result in plan deviations of $8 \pm 3\%$; including compensation for the presence of the couch reduced the deviations to $2 \pm 2\%$ (Figure 2).

Conclusion: We have a couch model that can be easily incorporated into planning procedures and which allows full assessment of the impact of the couch on the dose distribution.