AbstractID: 10384 Title: The Effect of Treatment Couch Attenuation on Radiation Dose for Megavoltage Photon Beams

Purpose: To investigate the attenuation of two types of linac couches and to evaluate its impact in radiation therapy with megavoltage photon beams.

Methods: The relationship of relative dose versus beam angle was established for two Varian 21EX linacs, equipped with Exact couch (standard couch) with sliding side rails and Exact IGRT couch, respectively. An ion chamber was placed at the center of a solid water cylindrical phantom positioned at the linac isocenter for 6MV and 18MV photon beams. Measurements were repeated with the phantom positioned at different locations on the couches with two different field sizes (5x5 and 10x10 cm^2). An IMRT GYN treatment plan was also delivered with standard couch, rails set at in and out position.

Results: For standard couch, the relative dose error caused by couch attenuation could be up to 26.8% for 6MV photon beams with sliding rails in the beam path and 13.3% with the rails not in the beam path. For the IGRT couch, the error could be up to 4.8%. Due to the architecture of the couches, the dose error is different for different disease sites; and is sensitive to radiation gantry angle for standard couch. Less dose error was observed for 18MV compared to 6MV beams with identical setup. For an IMRT GYN patient, two posterior oblique 6MV beams (out of 9 beams) accounts for 17.3% of the total MU, and the dose difference is 2.5% for rails set at in and out position.

Conclusion: Dose error introduced by the couch attenuation could be an issue for patient treated with oblique/posterior photon beams. Couch parameters should be included in the planning system. For linacs with standard couch, beam angles should be carefully selected to avoid the sliding rails. IGRT couch introduces less couch attenuation in general compared to standard couch.