

AbstractID: 1156 Title: Evaluation of 60 IMRT irradiations of an anthropomorphic H&N phantom

The Radiological Physics Center used a mailable anthropomorphic IMRT head and neck QA phantom to evaluate IMRT treatment delivery at institutions preparing to participate in NCI sponsored protocols. The phantom was irradiated by 51 institutions, some multiple times, for a total of 60 irradiations. Institutions were instructed to image the phantom, plan a treatment, perform their own QA checks, and irradiate the phantom. The water-filled phantom contained a polystyrene insert that incorporated solid-water imageable structures representing a primary planning target volume (PTV), a secondary PTV and an organ at risk (OAR). The insert held TLD in each structure and a set of orthogonal radiochromic films that intersected in the primary PTV. The following criteria were used to evaluate the measurements: TLD/institution dose – $\pm 7\%$; distance-to-agreement in the high dose gradient region near the OAR – ≤ 4 mm. 22 of the irradiations failed to meet the criteria. 12 of the failures were dose discrepancies measured with TLD, 5 were dose distribution discrepancies measured with radiochromic film and 5 were disagreements in both TLD and film measurements. Failures occurred in irradiations delivered by a variety of models of linear accelerator and planned with several treatment planning systems (TPS). Errors detected included inaccurate output factors in the TPS and imprecise beam modeling through the MLC leaves. The phantom was valuable for evaluating IMRT treatments at institutions preparing to participate in advanced technology clinical trials.

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