

AbstractID: 3646 Title: IMRT Head and Neck Phantom Irradiations: Correlation of Results with Institution Size

Purpose: To analyze the results from 136 IMRT H&N phantom irradiations.

Method and Materials: A mailable anthropomorphic IMRT head and neck phantom was irradiated 136 times by 104 institutions. Some institutions irradiated multiple times. Institutions imaged the phantom, planned an IMRT treatment, performed their routine IMRT QA checks, and irradiated the phantom according to their plan. The phantom contained imageable structures representing a planning target volume (PTV) close to an organ at risk (OAR), simulating an oropharyngeal tumor and the spinal cord. The phantom also contained a secondary PTV that simulated peripheral nodes. TLDs were placed in each structure and a set of orthogonal radiochromic films 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. The failure rate of institutions that housed 3 or fewer megavoltage therapy machines was compared to that of larger institutions.

Results: 41 irradiations failed to meet one or more of the criteria. 24 of the failures were dose discrepancies measured with TLD, 5 were dose distribution discrepancies measured with radiochromic film and 12 were disagreements in both TLD and film measurements. There was a 38% discrepancy rate in first-time irradiations at the institutions with 3 or fewer machines and a 26% rate at the larger institutions. All of the institutions that failed multiple times were smaller institutions.

Conclusions: Institutions of all sizes are capable of making mistakes in IMRT treatments. Sufficient physics coverage is an important aspect of IMRT quality assurance.

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