AbstractID: 11687 Title: Commissioning a new anthropomorphic spine and lung phantom to be used for remote dose verification of spine radiosurgery

Purpose: The commissioning of a new anthropomorphic spine/lung phantom for use in credentialing institutions for participation in an RTOG protocol comparing fractionated IMRT to radiosurgery for spine tumors.

Method and Materials: The spine/lung phantom was constructed to approximate the geometric distribution of anatomy encountered in spinal radiosurgery; these anatomical features include the spinal canal, vertebrae, esophagus, heart, lungs and tumor volume. The remainder of the phantom is water filled. These anatomical features were constructed from materials of different densities to allow for visualization with CT and for heterogeneous dose calculation verification. The tumor is loaded with TLD and gafchromic film in the axial and sagittal planes. To commission this system, planning and irradiation must demonstrate agreement of the measured dose distribution with the planned dose distribution to 5% within 3mm. First, two beams in an anterior-posterior arrangement delivered 8 Gy to 90% of the tumor volume. More complex plans are being developed to be administered.

Results: The anterior-posterior beam arrangement showed reasonable agreement with the planned dose distribution. The axial and sagittal plans had 87% and 91% agreement, respectively (at the gamma level 5%/3mm). These results validated the tool utilized to register the treatment plan to the measured dose distribution. The results also confirmed the accuracy of the treatment isocenter. However, because of the simple beam arrangement, the prescribed critical structure tolerances could not be achieved. The critical structure tolerances can be achieved with the development of a clinically relevant IMRT plan.

Conclusion: The phantom has been validated to register and calculate differences in planned and measured dose distributions with a gamma calculation. The simple anterior-posterior beam arrangement showed good agreement between planning and measurement. Next, clinically relevant IMRT plans will be administered to the phantom.

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