Purpose: To use an anthropomorphic spine phantom for dosimetric credentialing purposes in National Cancer Institute sponsored clinical trials.

Methods: An anthropomorphic spine phantom that consists of lungs, a heart, an esophagus, a spinal cord, vertebrae and an abutting planning target volume (PTV) was sent to institutions interested in becoming credentialed for a radiosurgery protocol for spine metastasis. The phantom contained film in 2 planes and TLD in the PTV. Institutions were asked to fill the phantom with water, image the phantom, create an IMRT plan for the spinal SBRT, perform image-guidance for the target localization, and to irradiate the phantom. They were also asked to perform the type of patient specific measurements that they would for an actual patient. TLD inside the PTV are required to be within ±7%. 85% of the analyzed area of film was required to pass a gamma analysis of ±5%/3 mm.

Results: 125 phantom treatment plans from 88 institutions were analyzed since 2009. Only 83 (66%) of the phantom irradiations passed the acceptance criteria. Of the 42 failures, 14 of the irradiations failed both the TLD and film criteria, 27 failed only the film criteria and 1 failed only the TLD criteria. Six institutions passed the criteria after including the couch in the calculation. The most represented planning systems, machine manufacturers and algorithm types have the ability to pass the phantom. Both pencil beam and superposition/convolution type algorithms can adequately account for the bone heterogeneity present in this phantom.

Conclusion: The phantom test is a critical credentialing tool to secure the high quality protocol study. Treatment couch attenuation could affect tumor dose delivery accuracy, especially in instances where the majority of the beams pass through the couch.

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