

AbstractID: 10793 Title: Simple commissioning and quality assurance of a gating system

Purpose: Gating systems rely heavily on technology and automation, which increase the need for quality assurance. This work develops a simple method for commissioning and quality assurance of the complete gating process.

Method and Materials: A lung phantom placed on a moving platform and was imaged with CT and 4DCT. The periodic superior-inferior motion (with adjustable frequency and amplitude) of the phantom was captured with RPM system and reflective marker block. CT images corresponding to 40%-60% expiration phase were selected for QA planning. Simple square fields as well as IMRT plans (using two different collimator angles) were simulated in the treatment planning system. The plans were delivered on a Varian 21Ex with OnBoard Imaging (OBI) capabilities. Radiographic films were inserted in the lung phantom during beam delivery. The phantom was positioned with OBI before the delivery of the plans. Each plan was delivered with and without gating for comparison. Films and dose planes from the planning system were analyzed using commercially available software, which produced dose difference and gamma index maps.

Results: The geometric accuracy of dose distribution of gated treatment delivery was verified to be within 5 mm. The nearly perfect sinusoidal motion produced by the platform resulted in more superior-inferior spread in the dose than initially planned. Intensity profiles were taken on films to document the normal amount of dose spread compared to the delivery of identical plan on static phantom. Analysis of gamma index and dose difference maps show that poor gated delivery result in increased dose outside the target volume and reduced coverage of the target.

Conclusion: A rapid method to verify the accuracy of a gating process has been developed using commercially available software. The implementation and needed frequency of the test will be discussed.