AbstractID: 9108 Title: On the Sensitivity of Film-Based, In Vivo Dosimetry to Setup Errors for Stereotactic Body Radiotherapy Treatments

Purpose: To determine whether film-based, *in vivo* dosimetry can be used to verify precise dose delivery of stereotactic body radiotherapy treatments and to examine its sensitivity in detecting rigid body shifts and introduction of inhomogeneities.
Materials and Methods: A QUASAR^{TM} respiratory motion phantom was CT scanned, in static mode, with an imaging insert containing two spheres of different sizes and a cube. A SBRT treatment plan was created with TomoTherapy TPS utilizing one of the spheres as the target volume. Dose prescription was 98% of target volume to receive at least 60.0Gy delivered in 5 fractions. The image set was imported into tomotherapy TPS as a patient image set for treatment planning and as a phantom image set for delivery quality assurance verification. Radiographic film was place at the couch table top below the phantom (coronal plane) during irradiation so as to measure the exit dose. Delivery was repeated with the introduction of various lateral shifts and inhomogeneities to the phantom. Calculated exit dose planes were extracted from the DQA analysis software and compared with measured films.
Results: Agreement between calculated and measured exit dose planes for the original setup was shown to be within 10%. Comparison profiles of the calculated and measured exit dose planes between the 2cm lateral shift and original setup indicate insufficient sensitivity of the film measurements to distinguish the expected differences and patterns. Similar conclusions were reached for 5cm lateral shifts and introduction of inhomogeneities.
Conclusions: According to preliminary results, film-based, *in vivo* dosimetry can be suitable for SBRT treatment verification but was shown not to be sensitive to detection of rigid body shifts and inhomogeneities. Further studies of different treatment sites are planned to determine if film-based, *in vivo* dosimetry can be used as a secondary technique for patient setup verification.