

AbstractID: 13423 Title: Management of inter- and intra-fractional variations in abdominal irradiation using gated in-room CT

**Purpose:** Images with high soft-tissue contrast are desirable in the management of inter- and intra-fraction variations for many anatomic sites, such as abdomen. We present a strategy of using a gated in-room CT to guide gated treatment delivery for the management of interfraction (setup errors and anatomy changes) and intrafraction (respiration) variations in abdominal irradiation.

**Method and Materials:** The process started with a 4DCT scan acquired and sorted into 10 phases. The 3 sets of images (40%, 50% and 60%) corresponding to the 3 phases around the end of exhale were fused in the treatment planning system. The target was delineated on all 3 sets of images separately and the internal tumor volume (ITV) was generated by tracing the 3 target contours with no margin. A 5 mm margin was added to ITV to generate the PTV. All the contours of organs at risk (OAR) were drawn on the 50%-phase CT. An IMRT plan was generated using a planning system (Prowess Inc). Prior to each delivery, a gated CT scan at the end of exhale was acquired using a CT-on-Rails (CTVision, Siemens). This gated treatment CT was registered with the planning CT starting with bony anatomy alignment, then fine tuned to soft-tissue alignment to calculate shifts. The gated IMRT were delivered after patient repositioning.

**Results:** The registration of the treatment and planning CTs was accurate due to the high soft tissue contrast and the breathing synchronized acquisition for the two CT sets. The ITV volume was reduced due to the gated delivery by 20% on average. Doses to OARs were substantially reduced due to the reduced PTV margin. Delivery times were extended by 2-3 minutes by gating.

**Conclusion:** The gated IMRT with gated CT-on-Rails guidance is an effective approach to manage inter- and intra-fraction variations in abdominal irradiation.