



Abstract #24987

Clinical Implementation of C-RAD for Efficient and Accurate Gated Delivery on a Mevion S250i System

Kai Yang, MS, Akbar Anvari, PhD and Carnell J. Hampton, PhD, Department of Radiation Oncology, Proton & Advanced Radiation Center, Atrium Health Levine Cancer Institute, Charlotte, NC

Abstract Text:

Purpose: To clinically implement C-RAD for gated beam delivery on a Mevion S250i Hyper scanning machine for thorax and abdomen patients.

Methods: Short 4DCT is used to qualify breathing motion before using compression belt to manage patient breathing motion for abdomen and thorax cases. Clinical treatment plans are generated robust to breathing motion. Site-specific tolerance is established based on retrospective analysis of patient breathing motion monitored with C-RAD system at all treatment couch angles. A QA program is established to monitor the performance of the C-RAD system on a daily and monthly basis for all couch positions.

Results: Compression belt effectively reduces diaphragm motion to around 1cm, above which co-optimization and repainting is utilized in addition to beam gating for motion management. All anterior beams are required to have a minimum 12cm air gap for better C-RAD camera view, while alternative lateral and posterior beam angles are usually sufficient for treatment planning. C-RAD agrees with the verification X-rays within 2mm and 2 degrees on all treatment positions. 3mm ISO and 5mm Vector tolerance is the best C-RAD could achieve for an efficient gating delivery, which all treatment plans are robustly optimized to ensure safe gated delivery. This systematic approach also allows us to do all gated delivery controls at will on the console without losing the non-gated delivery option when C-RAD system is down. Image and treatment Iso coincidence is confirmed daily with C-RAD within 1mm of baseline. Couch isocentricity is confirmed with X-ray monthly and agrees with C-RAD within 2mm and 2degrees for all couch positions.

Conclusion: Accurate and efficient motion management is achieved with the implementation of C-RAD for gated proton beam delivery, and it is critical to benchmark SGRT system performance against all uncertainties of established clinical workflow when incorporating the SGRT system into motion management solution.

Category:
Professional

Final Paper##:
SU-315-GPD-P-37

Title:
Clinical Implementation of C-RAD for Efficient and Accurate Gated Delivery on a Mevion S250i System